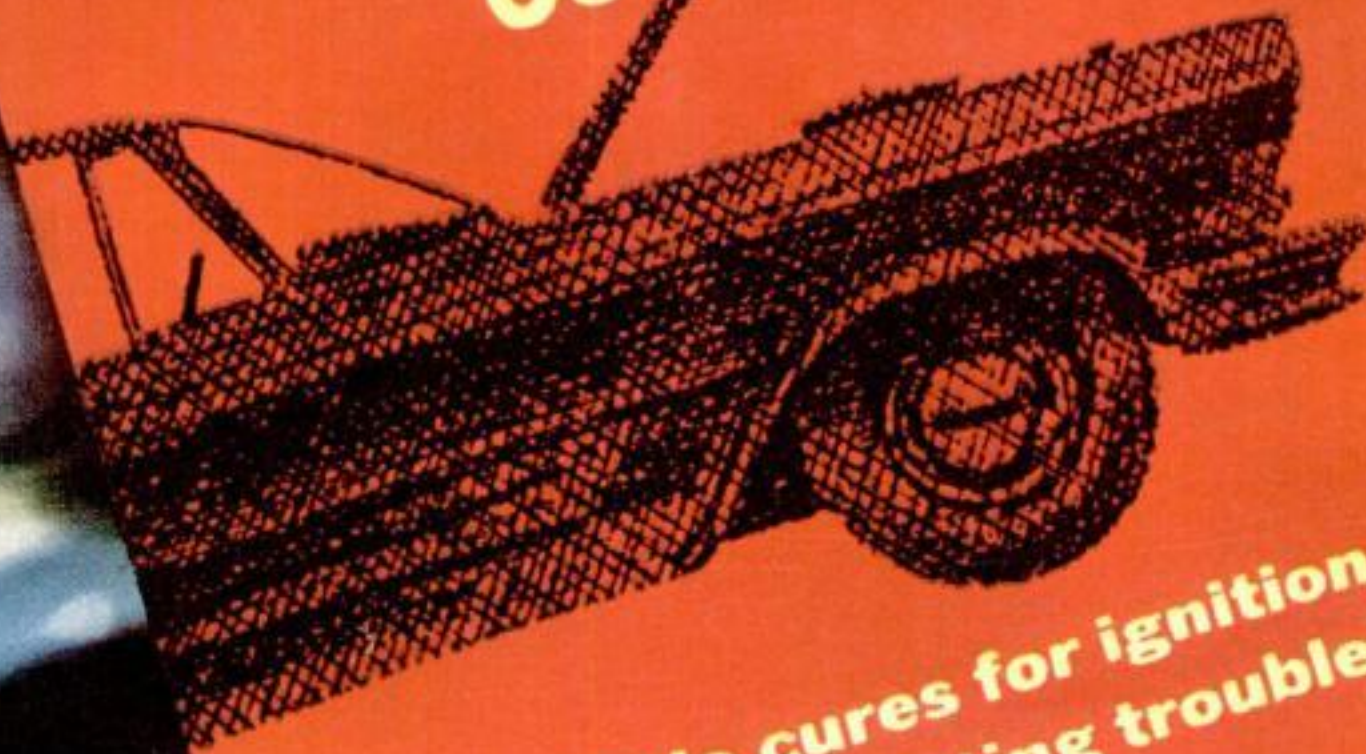


# POPULAR SCIENCE

JULY • 35¢ *Monthly*

POPULAR SCIENCE REFERENCE LIBRARY No. 3

## What to do When Your Car Conks Out



Roadside cures for ignition,  
fuel-line and starting troubles

Inside :

← Bonus Booklet  
for the Glove  
Compartment  
of Your Car

plus: How Doctors

Use Hypnotism



# FOR REPAIRING RADIO AND TV

Superior's New Model 670-A

## SUPER METER



A COMBINATION  
VOLT-OHM MILLIAMMETER  
PLUS Capacity, Reactance,  
Inductance and Decibel  
Measurements.

### ADDED FEATURE:

Built in ISOLATION TRANS-  
FORMER reduces possibility of  
burning out meter through mis-  
use.

### SPECIFICATIONS:

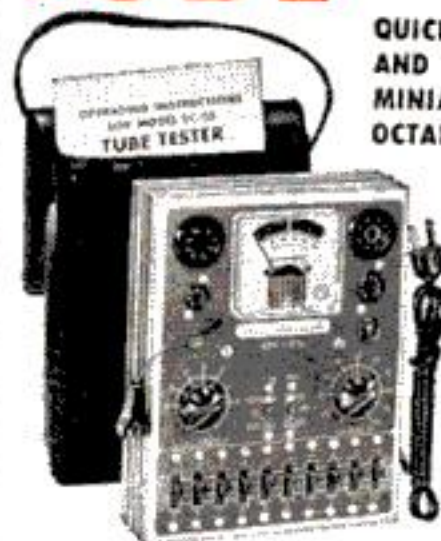
D.C. VOLTS: 0 to 7.5/15/75/150/750/1,500/7,500 Volts  
A.C. VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts  
OUTPUT VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts  
D.C. CURRENT: 0 to 1.5/15/150 Ma. 0 to 1.5/15 Amperes  
RESISTANCE: 0 to 1,000/100,000 Ohms 0 to 10 Megohms  
CAPACITY: .001 to 1 Mfd. 1 to 50 Mfd. (Good-Bad scale for  
checking quality of electrolytic condensers.)  
REACTANCE: 50 to 2,500 Ohms 2,500 Ohms to 2.5 Megohms  
INDUCTANCE: .15 to 7 Henries 7 to 7,000 Henries  
DECIBELS: -6 to +18 +14 to +38 +34 to +58

The Model 670-A comes housed, in a rugged crackle-  
finished steel cabinet complete with test leads and  
operating instructions.

**28<sup>40</sup>**

Superior's new streamlined model TD-55

## TUBE TESTER



QUICKLY AND EFFICIENTLY TESTS RADIO  
AND TV TUBES INCLUDING: SEVEN PIN  
MINIATURES; EIGHT PIN SUBMINARS,  
OCTALS AND LOCTALS; NINE PIN NOVALS

### YOU CAN'T INSERT A TUBE IN THE WRONG SOCKET.

It is impossible to insert the  
tube in the wrong socket when  
using the new Model TD-55.  
Separate sockets are used, one  
for each type of tube base. If  
the tube fits in the socket it can  
be tested.

### "FREE-POINT" ELEMENT SWITCHING SYSTEM.

The Model TD-55 incorporates a  
newly designed element selector  
switch system which reduces the  
possibility of obsolescence to an

absolute minimum. Any pin may be used as a filament pin and  
the voltage applied between that pin and any other pin, or even  
the "top-cap."

**CHECKS FOR SHORTS AND LEAKAGES BETWEEN ALL ELEMENTS.**  
The Model TD-55 provides a super sensitive method of checking  
for shorts and leakages up to 5 Megohms between any and all of  
the terminals.

### ELEMENTAL SWITCHES ARE NUMBERED IN STRICT ACCORD- ANCE WITH R.M.A. SPECIFICATION.

One of the most important improvements, we believe, is the fact  
that the 4 position fast-action snap switches are all numbered  
in exact accordance with the standard R.M.A. numbering system.  
Thus, if the element terminating in pin No. 7 of a tube is under  
test, button No. 7 is used for that test.

The Model TD-55 comes complete with operating instruc-  
tions and charts. Use it on the bench—use it for field  
calls. A streamlined carrying case, included at no  
extra charge, accommodates the tester and book of  
instructions.

**26<sup>95</sup>**

# FOR REPAIRING ALL ELECTRICAL APPLIANCES MOTORS AND AUTOMOBILES

Superior's New Model 70 UTILITY TESTER®



As an electrical trouble shooter  
the Model-70:

- Measures A.C. and D.C. Voltages, A.C. and D.C. Current, Resistances, Leakage, etc.
- Will measure current consumption while the appli-  
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- Incorporates a sensitive direct-reading resistance  
range which will measure all resistances commonly  
used in electrical appliances, motors, etc.
- Leakage detecting circuit will indicate continuity  
from zero ohms to 5 megohms (5,000,000 ohms).  
• Will test Toasters, Irons, Broilers, Heating  
Pads, Clocks, Fans, Vacuum Cleaners, Refrig-  
erators, Lamps, Fluorescents, Fans, Switches,  
Thermostats, etc.

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trical appliances, automotive equipment, etc.

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the Model 70 will test:

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Lighters • Stop Lights • Condensers •  
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Horns • Also will locate poor grounds,  
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JULY 1957



# Popular Science Monthly

July, 1957



*Off goes the chrome, as Studebaker tries for an answer to the billion-dollar question: "Do Americans really want a car without gewgaws?"*

## AUTOMOBILES

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*Complete Tear-Out Booklet:*

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How Doctors Use Hypnotism Safely • 97

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All About the New Motor Scooters • 67



*How do they handle? Easy to learn? What do they cost? PS tells you everything you should know about scooters. Plus spec chart*

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# America's Leading New-Idea Magazine for 85 Years

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13 Off-Beat Uses for Spring Clips • 146  
Three Modern Planters • 157  
How to Put Up a Rural Mailbox • 166  
PS Fix-It File: Window Screens • 169  
Short Cuts and Tips • 175



*Here's a portable-size radio with console quality. The case is actually a bass-reflex enclosure. Flashlight batteries run it. Transistors give durability and economy. Build it and love it*

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JULY 1957 3



# PS Readers

## TALK BACK

### New Car Purchase No Longer 'Confusing'

I HAPPENED on your May insert booklet in the PS Reference Library entitled "How to Buy a New Car." Your straightforward treatment of what is a most



confusing situation to many people is extremely attractive to me.

A. J. GUFFANTI, Senior Vice President  
Springfield (Mass.) National Bank

### Booklet Is Rich Fare

THAT new insert booklet idea (beginning in April) is like putting whipped cream on a fudge sundae (and I love rich food!).

JACK GIBSON, Philadelphia, Pa.

*For this month's booklet see page 129.*

### Suggests Girl Scouting as a Career

CONGRATULATIONS on your series to help parents guide their children toward suitable careers. Parents whose daughters are now in Girl Scouting might be interested in looking into a career where opportunities are growing almost as fast as our population. In the next five years the Girl Scouts will need nearly 3,000 women executives.

It's a career that offers a sense of satisfaction and achievement, as well as the practical advantages of one month's vacation, sick leave and retirement insurance. On-the-job training and a scholarship program help toward advancement. I shall be happy to hear from parents interested in learning more about the preparation needed for a career in Girl Scouting.

ISABEL KREMER, Director, Recruitment and Referral, Girl Scouts of the U.S.A.  
155 East 44th St., New York 17, N. Y.

... I have been reading with a great deal of interest your current series on education. The April article ["Can Your Youngster Get into College?"] was outstanding. Would it be possible to have about 100 reprints of this article?

NORMAN HAWHEELI, Supt. of Schools  
Dobbs Ferry (N. Y.) Public Schools

*The only reprints presently available are of "How to Be a Good Father to a Gifted Child" (March), sent in return for a stamped, self-addressed envelope.*

### His PS Stack Is 6' 5" and Still Growing

MY STACK of 300-odd PS magazines dates back to Nov., 1930. One of the feature articles was "Why Midget Golf Swept the Country"; the then much younger Gus was extolling the virtues of new 32-candlepower headlight bulbs (21 c. p. units being the challenger), saying, "... and believe me, they sure do light up the road." In the ads, Cadillac was beating the drum for its sleek eight-cylinder job. Price: \$2,695.

How many long-standing PS fans can show me up as a mere novice collector of magazines?

PHIL McCAFFERTY, Cedar Rapids, Iowa

### Car Air Conditioning a Puzzle?

WOULD you kindly clear up two points that puzzled me in your article on car air conditioning [May]? You state, "Expansion valves had to be designed to keep the Freon at a high enough level in the evaporator to do its work, but not so high as to let liquid Freon reach the compressor and damage it." How can Freon damage the compressor?

Second, do you really mean that Freon





# Get into your car with New Pride

Restore that **NEW CAR FEEL** with

Why drive a car that just "gets you there"—when it's so easy to have a car that's a thrill to handle... full of pep, performance and GO! Your Doctor of Motors—your skilled mechanic—knows how to bring back that satisfying "new car feel."

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You'll be surprised how quickly and economically your Doctor of Motors can bring back a "New Car Feel" to your car!



JULY 1957 5



# FIRST CHOICE IN ADJUSTABLE WRENCHES



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6 POPULAR SCIENCE

boils (in an air-conditioning system) like water?

ROYAL MILLER, Toronto, Ont., Canada

A pump valved to compress a gas can be damaged if it is fed an incompressible liquid. Second, Freon will boil at an extremely low temperature. Kept under high pressure in an air-conditioning system, its boiling point is raised. When pressure is reduced, it vaporizes (absorbing heat, cooling the car) without boiling.

## Rattlesnake Tales From a Reader

MAYBE the rattlers mentioned in your article in April ("Don't Believe These Tall Tales About Rattlesnakes") are different from the snakes in New England, but I think snakes *can* hypnotize.

I carry a revolver quite often when traveling in the country and have shot



a lot of snakes—at least 95 percent in the head or close to it.

My one experience with the power of a snake to hypnotize was when my wife and I were going to a farm in Cape Neddick, Me., for milk. A little girl stood in the driveway, a common garter snake coiled in front of her. After I killed the snake, the girl said she couldn't move or speak until I had broken the spell.

ELMER CRAWFORD, Kittery, Me.

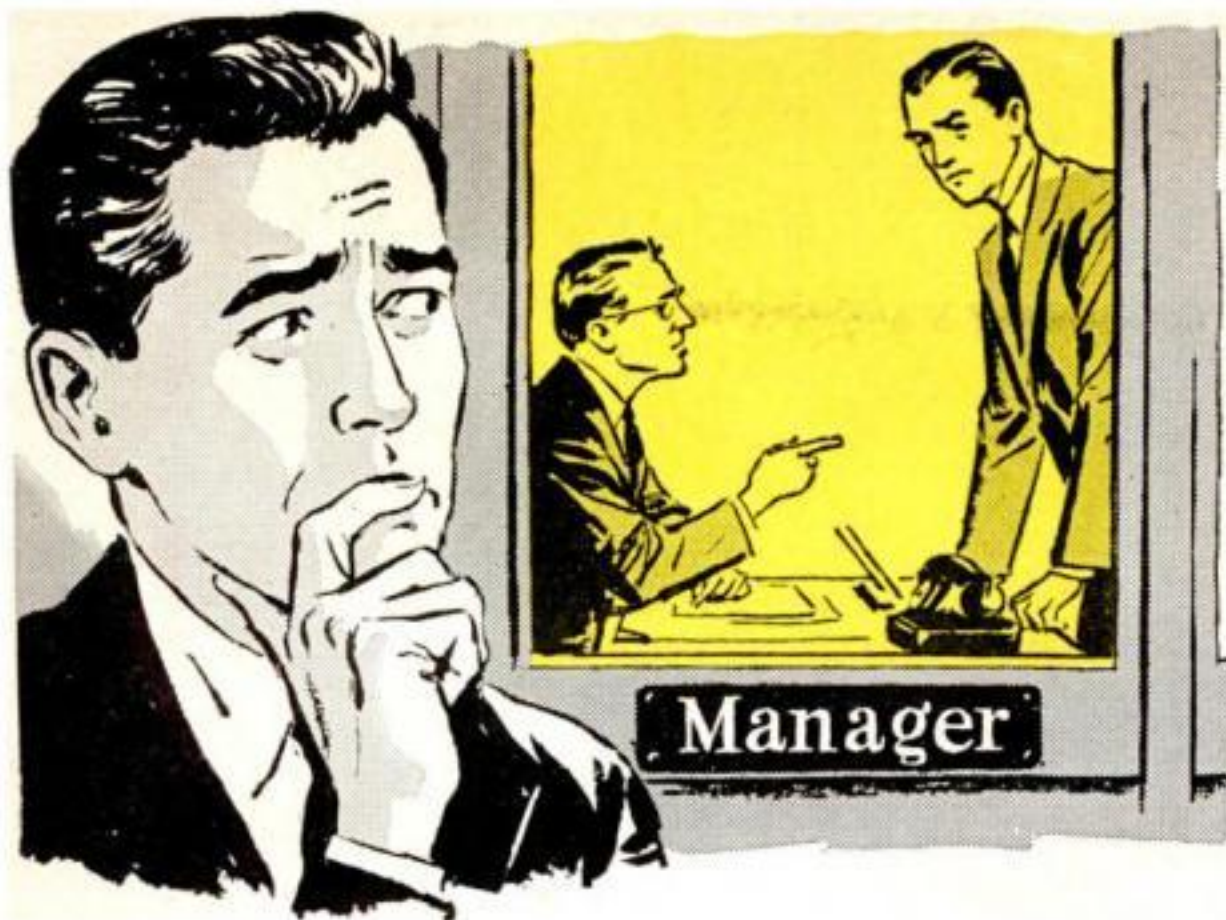
## Private Police Cars

I HAVE just read "Why You Can't Out-run the Police" [May]. Your statement on page 53, that "you can't buy a heavy-duty police car without proof that you work in a law-enforcement organization," is strictly for the birds. I live in the western part of North Carolina, and am personally acquainted with two people who own 1956 Ford police interceptors. (They got them *new* in '56.)

J. PHILIP NEAL, Burnsville, N. C.

... Read with great attention your article on "Why You Can't Outrun the Police." Apparently Detroit *can* build





# What's your boss saying about you?

The door is usually open. Today it's closed.

They're talking about you . . . about your future. You don't have to hear to know what they're saying. Because there's nobody who knows more about you and your present job than you.

O.K. . . . So you have "experience." Five years on the same job.

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If your answer is "yes," success is right around the corner. But if the answer is "no," then your experience doesn't amount to much. And chances are these things are true about you: you just "coast" along with things . . . you do nothing and go

home all tired out. **BEWARE!** Those are danger signals. Unless you take a fresh look at things, you'll be doing the same job at the same salary for the next five years. And the *next* five.

## What you can do about your future

If you want to succeed . . . make more money, earn the respect of your family and community . . . you have to take the bull by the horns. Success doesn't just come along. You have to meet it halfway. So act **NOW** and make your experience mean something. Add I. C. S. *training* to your record and start going places. Do it at home, in your spare time, for a few cents a day.

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  - ☐ High School Mathematics
  - ☐ Short Story Writing
- LEADERSHIP**
- ☐ Industrial Foremanship
  - ☐ Industrial Supervision
  - ☐ Personnel-Labor Relations
  - ☐ Supervision
- MECHANICAL and SHOP**
- ☐ Diesel Engines
  - ☐ Gas-Elec. Welding
  - ☐ Industrial Engineering
  - ☐ Industrial Instrumentation
  - ☐ Industrial Metallurgy
  - ☐ Industrial Safety
  - ☐ Machine Design
  - ☐ Machine Shop Practice
  - ☐ Mechanical Engineering
  - ☐ Professional Engineer (Mech)
  - ☐ Quality Control
  - ☐ Reading Shop Blueprints
  - ☐ Refrigeration and Air Conditioning
  - ☐ Tool Design
  - ☐ Tool Making
- RADIO, TELEVISION**
- ☐ General Electronics Tech.

- ☐ Industrial Electronics
  - ☐ Practical Radio-TV Eng'r'g
  - ☐ Practical Telephony
  - ☐ Radio-TV Servicing
- RAILROAD**
- ☐ Car Inspector and Air Brake
  - ☐ Diesel Electrician
  - ☐ Diesel Engr. and Fireman
  - ☐ Diesel Locomotive
- STEAM and DIESEL POWER**
- ☐ Combustion Engineering
  - ☐ Power Plant Engineer
  - ☐ Stationary Diesel Engr.
  - ☐ Stationary Fireman
- TEXTILE**
- ☐ Carding and Spinning
  - ☐ Cotton Manufacture
  - ☐ Cotton Warping and Weaving
  - ☐ Loom Fixing Technician
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  - ☐ Textile Finishing & Dyeing
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cars if they have to, and put everything into them that is needed—high-speed cam, extra-capacity radiator, high-speed fan, high-lift cam, heavy-duty transmission and clutch, finned brake drums, and heavy-duty springs and shocks. Also a stiffer front end.

G. G. RUBEN, Everett, Wash.

... Are reprints of "Why You Can't Outrun the Police" available? Our club read your article and decided to ask for reprints for the entire student body of Collinsville High School. I think they will find such an article very educational.

JOEL OLSON, Chairman, Teen Age Civil Defense, Collinsville, Okla.

*No reprints of this article are available, but Mr. Olson is welcome to make copies for distribution to this group.*

#### Framed by a Movie Bug

I GREATLY enjoyed reading your article on high-speed industrial cameras [May]—especially since I'm a movie bug. However, I think you had better recheck your copy. Listen to what I found on page 82: "At a projection rate of 24 frames a min-

ute . . ." Four hundred feet run in 11 minutes is 24 frames per second.

RONALD DIVIAN, Miami Beach, Fla.

*Right. PS goofed.*

#### No Substitute for the Real Thing

PLEASE—always start such articles as "The Secrets of Masonry Cutting" [May] with "Put on your safety goggles." You still can't see with a glass eye!

GLENN T. GOUGH, O.D., Topeka, Kan.



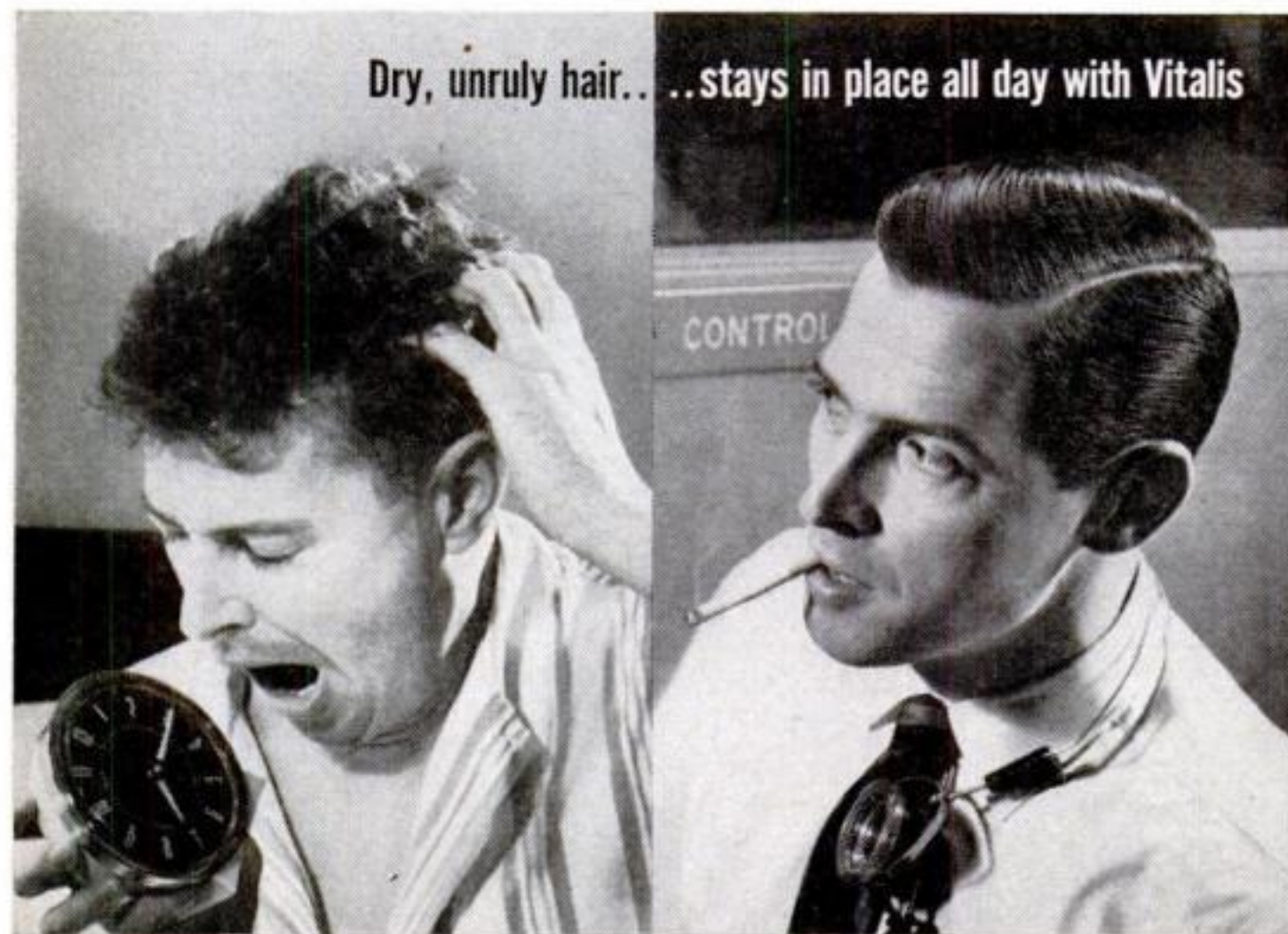
#### In 1877 PS's Forte Was Philosophy

WE ARE compiling a syllabus of readings to be used in our course in Introductory Philosophy. We would like permission to use Charles S. Peirce's article "The Fixation of Belief" originally published in POPULAR SCIENCE MONTHLY, of November, 1877.

PAUL A. REEDER, Philosophy Dept.  
Los Angeles (Calif.) City College

*Permission granted.*

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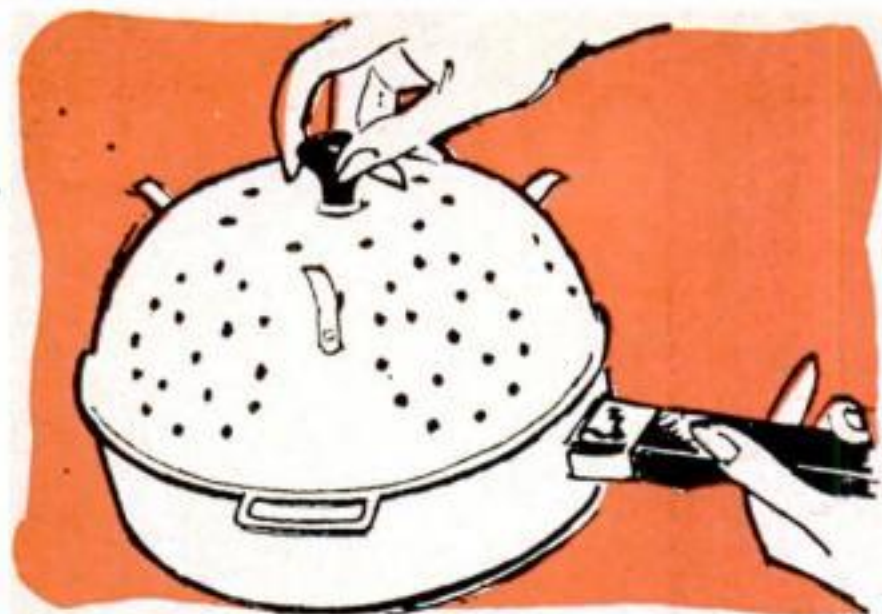
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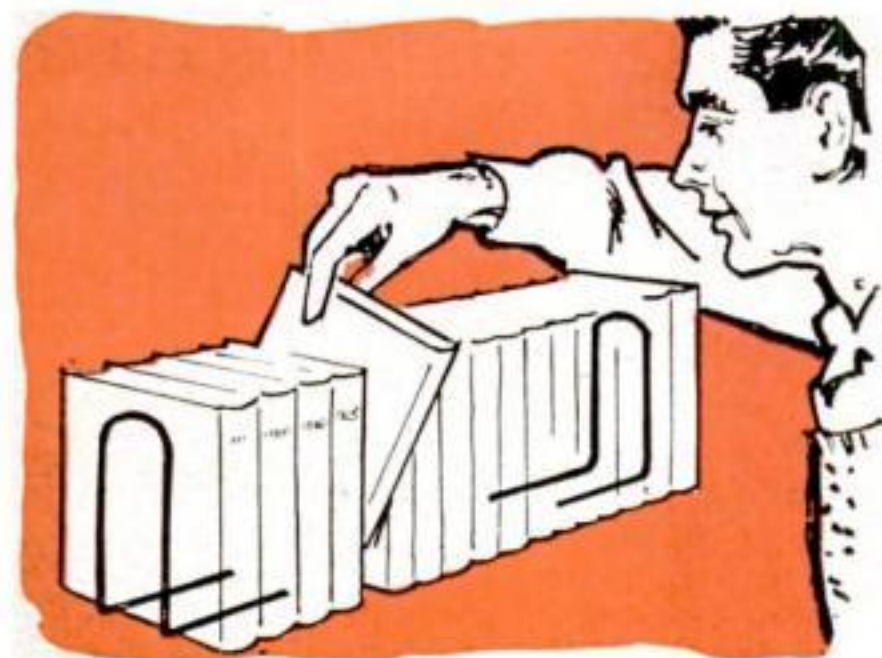
JULY 1957 9



# Keeping the Home Shipshape



**AN UP-ENDED COLANDER** is a fine spatter shield for a skillet, yet still allows steam to escape for crisp frying. A pot knob fixed to the colander bottom makes it easier to handle.



**LIGHT BOOKENDS** for a desk can be made from the crossbars of two wire coat hangers. Shape each length of wire into a U, then bend up the closed end and slip the open legs under the books.



**WOODEN WINDOW SCREENS** ousted by metal ones are still useful in the garden. Tack canvas over the mesh and prop them up with long dowels to serve as sun screens and windbreaks.



**A WHOPPING PISTOL**, jigsawed from plywood, will give the family cowpoke a place to park his guns. Half of a large wooden spool makes the cylinder. Wire forms the trigger guard.



**PAPER PLATES** won't take off like flying saucers at a barbecue if you provide each diner with two. Thumbtack one to the table and press the other over it, tamping it down firmly.



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# Prize Projects BY PS READERS



**Steeds for Six.** Steel-drum horses prance in circles on a merry-go-round built by Albert Green of Dansville, N. Y. It is run by a  $\frac{1}{4}$ -hp. washing-machine motor with a speed-reduction pulley arrangement. A large drive belt transmits power to the circular outer frame of the carousel.

The drums are mounted on angle irons bolted to the outer frame and its hub—a Ford Model T wheel. Youngsters ride to authentic music taped by Green at carnivals and fairs.



**Plastic Speedster.** Sparked by a display of homemade baby cars (PS, Apr. '55), Lennart H. Brune of Philadelphia wrapped a molded body around a two-hp. Continental motor to produce his Royal Fury.

Layers of glass-fiber and resin were laid up by hand over a mold of laminated wood. The four body sections, and the separate air scoops, were then joined by pouring plastic into the cracks. Brune figures that the 25-m.p.h. bantam cost him about \$1,000.



## **Postman Tries Sea Legs.**

This slickly professional job is the envy of the neighbors of Richard Bellamy of Midwest City, Okla. Bellamy built the boat—and also its winch-equipped trailer—so he could spend his leisure time away from the hard pavement he pounds on his daily mail route.

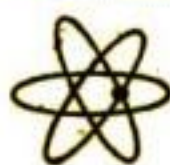
Have you recently completed a workshop project of which you are particularly proud? Send a good photograph of your work, along with the negative and a brief description,

to the Mechanics and Handicraft Editor, POPULAR SCIENCE, 353 Fourth Ave., New York 10, N. Y. We will pay \$15 for each item that is accepted for publication.



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# "I'd like to see them make..."



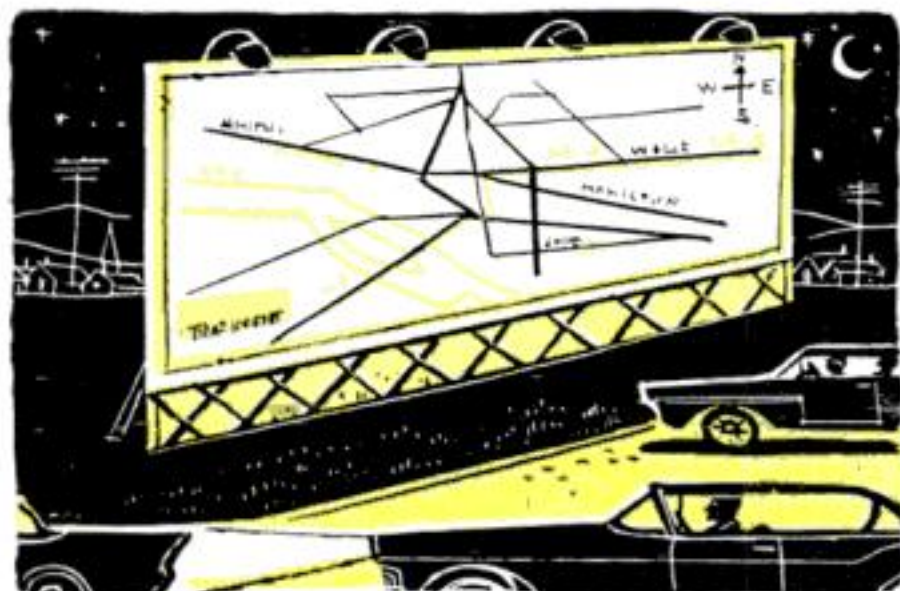
**A SUMMERTIME WINDOW SPRAY** that would block the sun's infrared radiation, but allow light rays to pass through. In the fall, you'd wash it off.—*Morris E. Harvey, Boulder, Colo.*



**FLOATING SWIM FINS AND MASKS** that would not sink if they came off in the water. Inflatable rims might be the simplest way to add buoyancy.—*Charles Goodman, Fort Worth, Tex.*



**A TELESCOPING WAND** that could be locked over the cut-off handle of any mop, broom or sweeper. Then these cleaners could be stored in low cabinets.—*Shirley Clonan, Colonia, N. J.*



**BILLBOARD-SIZE MAPS** along highways, showing local roads and towns. They would be illuminated at night, and a drive-in area would allow parking.—*Wm. Garrison, Glen Ellyn, Ill.*



**A GLUE SPRAYER** like a paint sprayer, but on a small scale. It would be mighty handy when you wanted to spread glue evenly over large surfaces.—*Avis Taylor, Erinsville, Ont., Canada.*

Everyone has his own pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were suggested by POPULAR SCIENCE readers. What's

yours? We will pay \$5 for each one published. Please use Government postcards only. Write name and address clearly. Contributions cannot be acknowledged or returned.



# Get "The Most" in Pay and Job Security— LEARN AIR CONDITIONING

**MAKE HOME YOUR TRAINING SHOP**

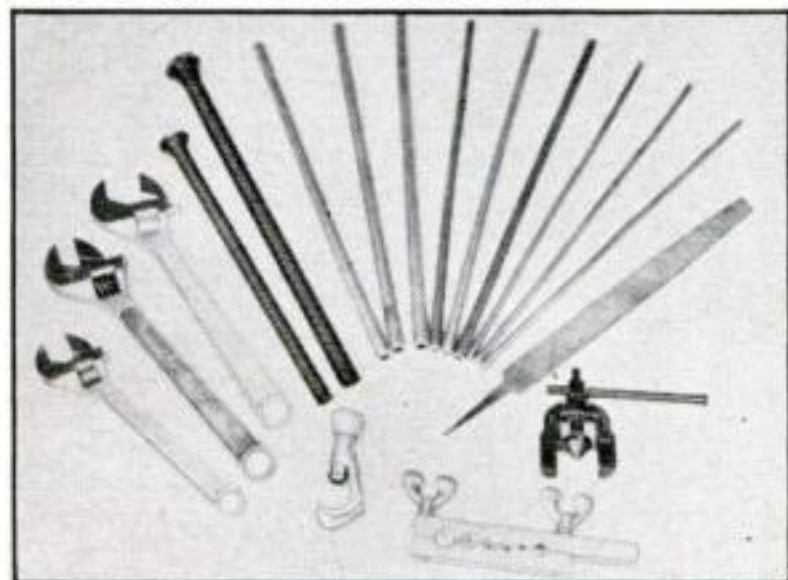
**& REFRIGERATION**



BUILD A REFRIGERATOR,  
AIR CONDITIONER,  
FREEZER or  
COOLER

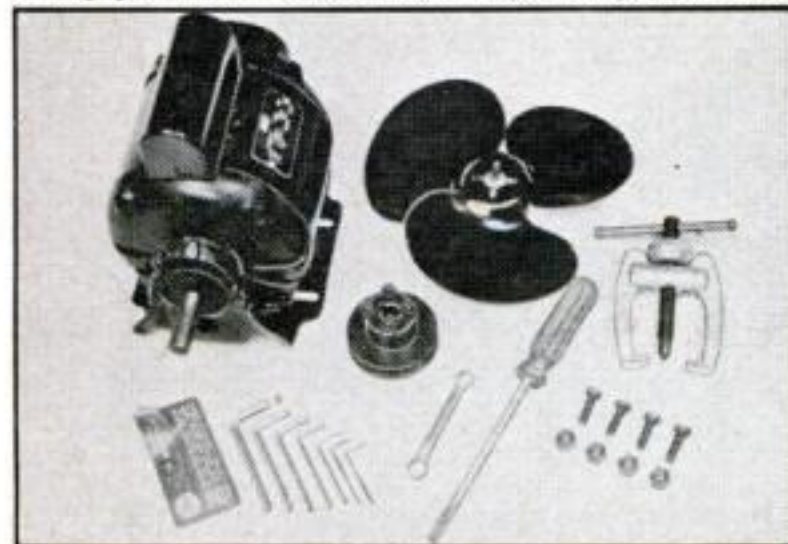
## You Practice with 23 Kits

You learn fast because CTI sends you 23 kits. Illustration shows heavy-duty 1/4 h.p. refrigeration high-side which you will build—and keep. Only CTI sends these kits.



## You Get Professional Tools

Here are tools included in just one kit. You get other tools, tubing, much equipment. Tools develop your interest and skill, speed up training.



## You Learn in Easy Stages

Another kit, which includes motor, fan, pulley, service tools. Kits are sent on a planned schedule to help you learn in easy stages. There's no other training like this!

## A GOOD JOB, MORE MONEY, BRIGHT FUTURE

—all three can be yours in the Air Conditioning & Refrigeration field! *Thousands of mechanics are needed to repair and service the 150 million units in use—and the six million air conditioners, freezers and refrigerators that are produced each year. You can earn more money in a better job—if you are trained. For information on how to get this training, just fill out and mail coupon below. No obligation!*



R. C. Anderson  
President CTI

## A New, Easy Way to Learn in Months

CTI training is quick and effective because it is *practical*. You learn by doing. During the course of your training, you receive 23 big kits, including tools. You practice with these kits, get valuable experience. For instance, *you do 10 complete service and trouble-shooting jobs with CTI kits*. You assemble a heavy-duty, commercial type, 1/4 h.p. high side (illustrated at left). You build an air conditioner, refrigerator, freezer or milk cooler—and you keep and use this valuable unit! Only CTI sends you these fine tools and kits—helps you get real *on-the-job* training! And all this fine equipment is yours at *no extra cost*! With CTI training you can *start out* as a mechanic and avoid years of work as a lower-paid apprentice.

## Earn Good Income as You Train, too

CTI training is so practical that students often work in spare time repairing air conditioners and refrigerators. *They add to their income this way*. Some get jobs with local dealers; others work on their own. Many students go in business on graduation. A number get full-time jobs while they're students.

## A Wonderful Opportunity to Be the Boss

If you want to own a business, Refrigeration offers you opportunity for success. Since most jobs are service calls, you can build up a list of potential customers. Very little capital is needed to start.



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Mail coupon below for two books which give you complete information. One is entitled *Success in Air Conditioning and Refrigeration*. The other is a *Lesson Sample*. Both FREE.

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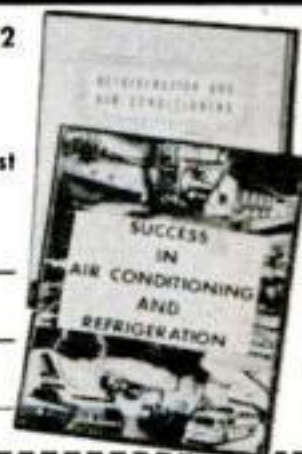
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JULY 1957 15



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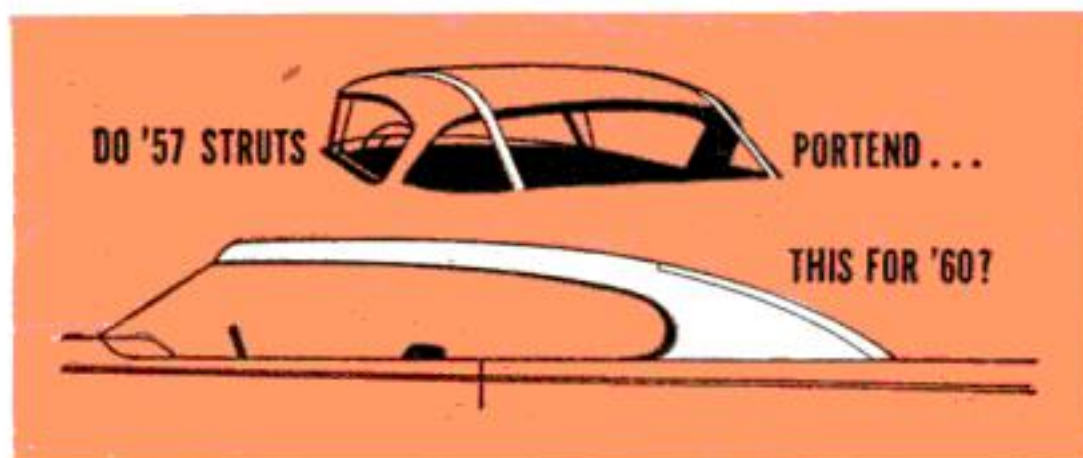


# You ought to know...

.....

**Detroit is washing its hands,** lily-white, of auto racing. Races and tests may go on, but without help or sanction from the manufacturers. The move is a reaction to: (1) Congressional hearings last year, which sharply criticized the industry for putting too much emphasis on power and speed, too little emphasis on safety; (2) laws, being debated in a dozen state legislatures, that would limit horsepower or require speed governors on all cars. What'll they use for advertising copy now?

**They say in Detroit:** The wraps concealing Ford's brand-new Edsel won't be off until September, but the rumors are flying fast. Shift buttons for the automatic transmission are reportedly in the middle of the steering wheel. And the springing may be entirely air, like the suspension on the Cadillac Eldorado. You'll see the real thing in all details in PS soon . . . Those struts across the rear windows of the '57 Buick and Olds are a hint of the future. They were used to soften up the customers for a startling design GM is brewing for 1960: a completely cantilevered roof supported only at the rear—no front or door posts at all (see sketches below). This would provide a real greenhouse of a passenger compartment, surrounded by uninterrupted glass on three sides. The customers didn't cotton to the '57 struts, however, and they'll disappear in '58. But the cantilever job is still a hot possibility for later . . .



You're right if you surmised that they've almost stopped making black cars. Dodge reports that all-white is its best-selling solid color, but a lush metallic gold and white goes even better (12 percent of total output), and a real cool

flame-red and white is a close runner-up (10 percent).

**Radioactive genesis.** Ironically, the very same atomic rays that threaten to wipe life off this planet may have given birth to life on earth in the first place, a few billion years ago. That's the story from three scientists of the General Mills Research Laboratories. They exposed a simple chemical, ammonium carbonate, to the gamma rays from a piece of radioactive cobalt. The ammonium carbonate was transformed into a lot of more complex chemicals, including some amino acids. Amino acids are what protein, the stuff of living tissue, is made of. Other scientists have created amino acids by means of electric discharges or electron beams.

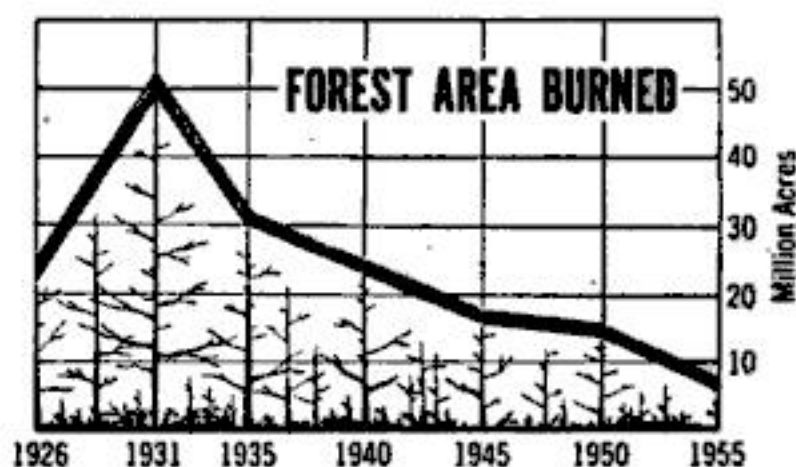
Many scientists now picture genesis this way: In the beginning there was the sea, a primordial soup of the elements—carbon,



# You ought to know...

hydrogen, oxygen and so on. Something—heat, electric discharges (lightning) or atomic rays—made the elements join into simple chemicals like ammonia and carbon dioxide, then complicated compounds like amino acids, and finally those very complex materials that make living, reproducing cells. The earth was quite hot billions of years back, lightning flashed then, and naturally radioactive elements like uranium and thorium would have provided plenty of atomic rays. These life-making processes are still going on in the oceans, only they don't get very far now—the newly created compounds are quickly gobbled up by the living cells that got there first.

**An encouraging victory over forest fires** has helped to keep up our supply of wood for houses, furniture and paper. The timber wasted by



Source: American Forest Products Industries

fire has decreased steadily since the terrible year of 1931, when 50 million acres burned (see chart). This, coupled with the expanding business of cultivating trees as a farm crop, has finally made our intake and outgo of lumber about even—practically as many

usable trees were growing as were cut in 1955. The fire loss is still huge, however. In 1955, forest fires—145,180 of them—devastated 8,068,601 acres. Nine out of 10 of the fires are caused by human carelessness—so use the ashtray in your car!

**Kids get car-sick?** Here are some tips from the American Medical Association for keeping tummies on an even keel during vacation trips:

- Try to make the kids sit with heads still, tilted back in a sort of “deck-chair” position. This prevents some of the nerve-tickling action inside the ear, which causes motion sickness.
- Play “Who can see a horse (or cow, or tractor)?” This keeps their eyes focused on the horizon, which doesn’t jump around.
- Don’t play the license-spotting game. Close attention to nearby objects moving fast makes anybody queasy. For the same reason, don’t let them read or crayon.
- Feed them a light meal before starting out. Once under way, light or heavy meals won’t make any difference.
- Let them sit up front. The ride is smoother there. Stopping for walks helps, too.
- Give them pills. An Army test showed Marezine, Bonamine and Phenergan to be the most effective against seasickness. (Remember they’re kids and get kid-size doses.)

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A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

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*Registered Patent Attorneys*

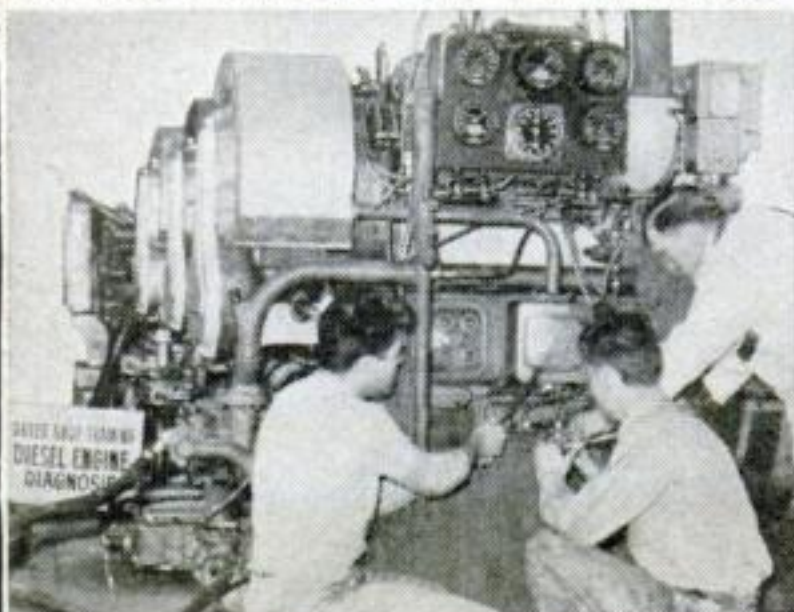
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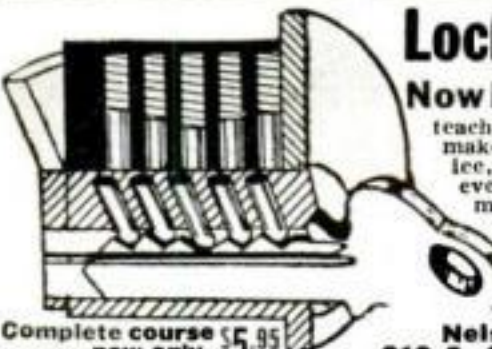
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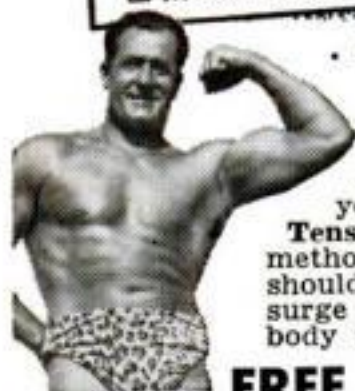
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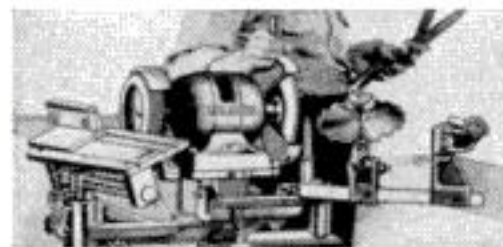
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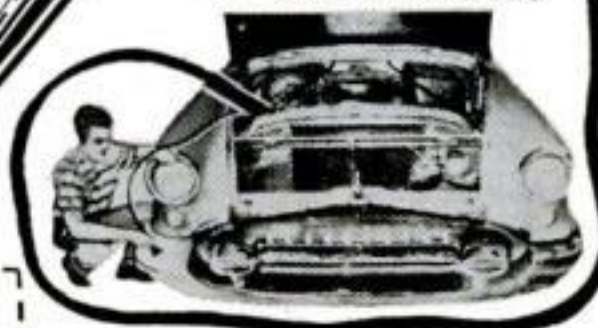
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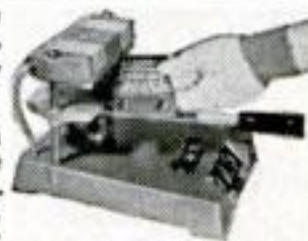
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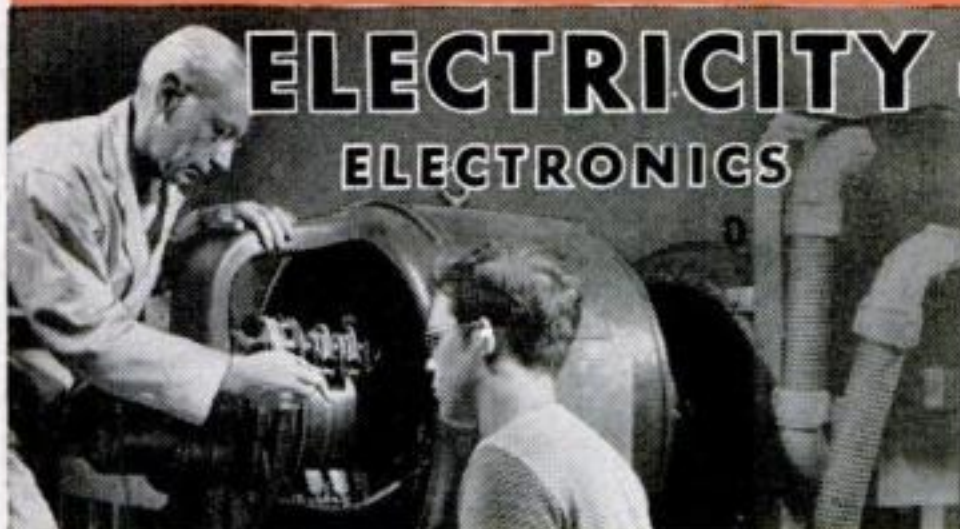
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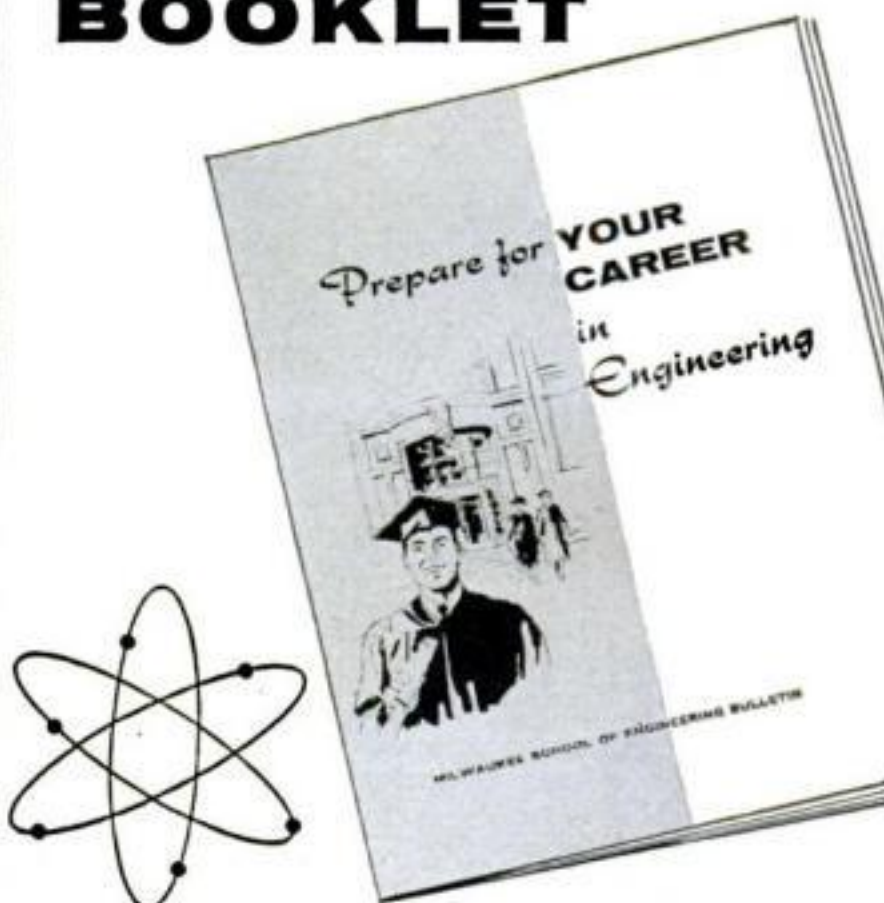
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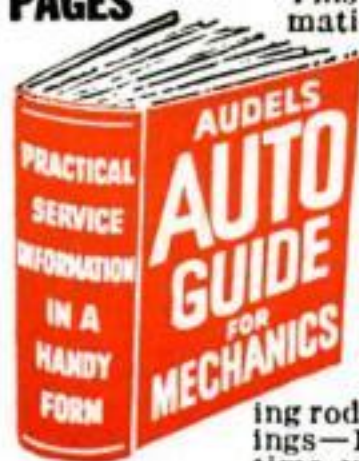
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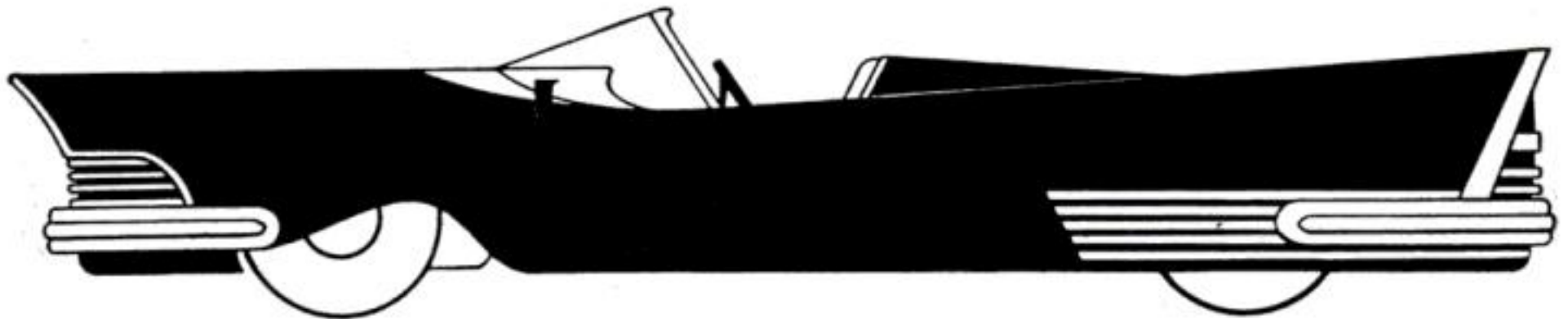
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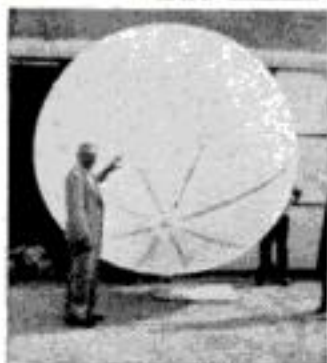
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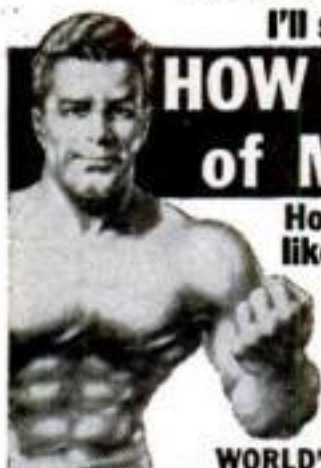
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**SONGWRITERS!** Protect your ideas! Hold all poems, songs! Write for safe, correct procedure! Song Service, Dept. PS, 333 W. 56th, New York 19.

**POEMS** wanted for new songs. Send poems. Immediate consideration. Crown Music Company, 49-P West 32 Street, New York City.

**SONG** Poems Wanted. Five Star Music Masters, 646 Beacon Building, Boston.

**NEW** Songwriters, Songpoets share \$29 million dollars yearly. Songs composed, published, promoted by largest firm. Information, appraisal Free. Send Nordyke Publishing, 6000 Sunset, Hollywood 28PS, California.

**DISCOUNTS** Instruments accessories national brands. Tempo Music, 37 Cutler, New London, Connecticut.

**ELECTRIC** Guitars, amplifiers, wholesale. Free catalog. Carvin, PSM, Covina, California.

**ACCORDIONS** Wholesale—10 day trial. Free Catalog. American Accordion Center, 5329-PS-7, Belmont, Chicago.

**COMPLETE** Music Service For Amateur Songwriters. Jerry Colonna, Box 888, Burbank, Calif.

**RADIO, TELEVISION, SUPPLIES & EQUIPMENT**

**TV** Sets—10 to 21"—\$12 up, catalog available others. Surplus Appliances, RFD 2, Abele Park, Putnam Valley, New York.

**GOVERNMENT** Surplus radios, radar, sonar, parts. Fascinating picture catalog 5c. Meshna, Malden 48, Massachusetts.

**"20 CRYSTAL** Set Plans" Handbook 30c. Laboratories, 328-T Fuller, Redwood City, California.

**WALKIE-Talkie**. Build wireless two-way radiophone for less than \$10.00. Plans and assembly photographs only 50c. Springfield Enterprises, Box 54-A7, Springfield Gardens 13, N. Y.

**FREE!** Giant Bargain Catalog. Transistor, "Sun" Radios, Kits, Portables, Audio, Electronics, Photographic, Optics, Tools, Household. Write Lektron, 131S Everett Ave., Chelsea, Massachusetts.

**ELECTRIC** Guitars, amplifiers, wholesale. Free catalog. Carvin, PSR, Covina, California.

**REPAIR** Your Own TV Set. Send Make & Model With \$2 For Diagram And Instructions That Show You Which Tube To Change To Correct Snowy Pictures, Sound Failure, Picture Failure & Etc. Holly Electronics, 518 Rider, Pampa, Texas.

**ULTRA-Linear** Amplifiers: 30 watts \$59.95; 50 watts \$89.95. Complete, not kits. Fulton's, Box 980, Tulare, California.

**37 BUSINESS OPPORTUNITIES**

**OPERATE** profitable mail order business. Write Walter Service, 4159-B East 112th, Cleveland 5, Ohio.

**WE** Love our mailman. He leaves over \$1,000.00 monthly in our rural mailbox. My college professor husband drafted a scientific home mailorder method. We bought a Texas ranch, live as we always wanted. Now we sell the "Ranch Mailorder Method." Operates anywhere. Inquire: Eveningshade Ranch, Boerne, Texas.

**BREED** Rare Tropical Fish at home. Earn Big Money! Learn Secrets! Help fill huge demand. Amazing Opportunity! Free Plan. Tropical Fish Breeders, Los Angeles 61, Calif.

**BE** appointed state notary public now. Write—Stationers, Boerne, Texas.

**FIX** Typewriters. Inexpensive home course teaches Factory Secrets. Free Booklet. Write, Typewriter, Tarentum 2, Pennsylvania.

**WHOLESALE**—Get the big merchandise—furniture, appliances, TV's, clothing, tools, auto accessories—most anything. Save half. Literature Free. Associated Wholesalers Service, 1016-C Starr, Burlington, Iowa.

**BRUSH** Plating Outfits for plating articles in the home and shop. No tanks necessary. Silvering Mirrors spare or full time. Free particulars. Gunmetal Co., Ave. E, Decatur, Illinois.

**\$70 WEEKLY**—Home, spare time. Simplified mail bookkeeping. Immediate income—easy! Auditax, 34757D, Los Angeles 34.

**FREE** Folio "\$5,000-\$45,000; Unlimited Vacations." No merchandise, equipment. Unknown! Work home—sparetime! Haylings—S-16, Carlsbad, Calif.

**11,000 NEW** Prospects Daily. Baby record books, shoes, albums. Sell mailorder. Use our literature. Write: No-Co-Ro, Capitola, California.

**GROW** Expensive Herbs for Us! Big Profit Home-Business of your own. Year around profitability. We supply everything necessary! Send for Free Rare Seeds And Revealing Plan. National Herb Exchange, Dept. JY, Gardena, California.

**LOOK ENJOYABLE ADDRESSED REQUESTS!** reasonably. Fast service. We have capable addressers in your city. Glenway System, Box 6568, Cleveland 1, Ohio.

**REBUILD** batteries; Make rubber stamps; Repair dolls. Catalog "60 ideas" free. Universal, Box 1076-B, Peoria, Illinois.

**LEARN** Photo-Negative (Portrait) retouching. Men, Women \$5 hour possible spare or full time at home. Easy, glamorous. Work for Photographers by mail order. Full details sent Free. Duval, 100 South Vermont, Los Angeles 4.

**MAKE** Extra Money. Cash commissions. Everybody buys easy-to-sell Advertising Book Matches. Union label. Big variety—Glamour Girls, Scenics, Hillbillies, Powerhouse selling kit Free. Steady repeat business. No experience necessary. Superior Match Company, Dept. PX-757, 7528 S. Greenwood, Chicago 19.

**YOUR** Own name brand business. No investment; no inventory. Part time or full time. Sell famous brands of appliances, housewares, silverware, radios, vacuum cleaners, lamps, tools, clocks, watches, jewelry, etc., etc., over 1,000 items. Join thousands of successful independent dealers. Send for Free catalog and dealer price list. H. B. Davis Corp., Dept. 14, 145 W. 15 St., New York City.

**PRINT** for Profit at home. Amazing new method prints colorful posters, banners, greeting cards, glassware—anything Hundreds at time. No press needed. No art. Fantastic profits! Need representative your area immediately! Free home-business plan. Screen-Print, Dept. JY, Los Angeles 61, California.

**BUY** Wholesale! Discounts to 80%! Appliances, Cameras, Sporting Goods, Housewares, Watches, Tools, Clothing, etc. Buy-Rite, Hawthorne 5, New Jersey.

**PLATE** Baby Shoes, jewelry, gifts, bronze and colored pearl. Free booklet. Anderson, 11029 South Vermont, Los Angeles 44.

**GROW** Orchids at home—profitable—fascinating. Year 'round, Maine to California. No Greenhouse. Successful home grower shows you how to provide proper temperature and air conditions in any well lighted room. Full details & real Orchid Seeds Free. Orchidland, 100 So. Vermont, Los Angeles 4.

**LEARN** Appliance Service and Repair. Motors, Washers, Refrigeration, Cleaners, everything. Free Booklet. Armstrong, 11027-B South Vermont, Los Angeles 44.

**START** your own subscription service. Every family buys magazines. No capital needed. We tell you how, furnish all supplies Free. Liberal commissions. Write McGregor Magazine Agency, Dept. 130, Mount Morris, Illinois.

**FABULOUS** profits raising Crickets, Earthworms; Free literature. Kean, Ladonia, Texas.

**MAKE** Money Growing Miniature Trees on your Window Sill. Free Seed and Plan. Miniature Nurseries, Dept. JY, Gardena, California.

**\$250 WEEK** reported! Free book "505 Odd, Successful Businesses." Work home! Expect something Odd! Pacific-36C, Oceanside, California.

**VENDING** Machines—No Selling. Operate A Route of Coin Machines And Earn Amazing Profits. 32-Page Catalog Free. Parkway Machine Corporation, Dept. 18, 715 Ensor Street, Baltimore 2, Maryland.

**FREE** Folder: "How to make \$3,000 yearly, sparetime, Backyard, raising Earthworms!" Oakhaven-42, Cedar Hill, Texas.

**MINK** Raising information free. Complete. Lake Superior Mink Farm, Superior E E5, Wisconsin.

**HOME-Import** Mail Order Business—Import profitable items below wholesale. Experience and product investment unnecessary. Full, spare-time. Famous world trader guides you. Free list "157 imports", details. Mellinger, G697, Los Angeles 24.

**ELECTRONIC** Plating Equipment, Anodes, Solutions. All types, including New Electroless nickel. Baby Shoe Metallizing Equipment, Supplies. Free Catalog. Hollywood Bronze Supply, Dept. B-1, 1624 East First, Los Angeles 33, California.

**START** A Buying Service, buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, Hertel Station, Buffalo 16-N, N.Y.

**REVOLUTIONARY** New Dishwasher. Lightning seller. Ends dishwashing drudgery. Dishes gleam. Send no money. Just your name. Kristee 109, Akron, Ohio.

**FREE** Cadillac, \$10,000 yearly. Cars appliances wholesale. Strateway, 2114B, Charlotte 7, North Carolina.

**CASH** from Sawdust (seventy methods). Tin-cans (thirty methods). Newspapers (eighteen methods). Instructions 50c each. All three \$1.00. Charles Company, 12-EXV, Norwood, Ohio.

**BIG** Money Raising Fishworms and Crickets. Free Literature. Carter Worm Company, Plains, Georgia.



**WE Pay \$3.50 lb. Grow Mushrooms.** Cellar, shed and outdoors. Spare, full time, year round. We have over 25,000 customers. Free Book. Washington Mushroom Ind., Dept. 178, 2954 Admiral Way, Seattle, Wash.

**IMPORT** your own products in small lots. Also, start profitable mail order business using International Dropshipment method. Capital unnecessary. Free details. Ga. Overseas Trading Co., Dept. D 3, 715 Persons Bldg., Macon, Georgia.

**IMPORT—Export** modern dropship method. Profitable details. The Hazen Company, 6601-8th Avenue North, St. Petersburg 2, Florida.

**AUSTRALIA!** For "Down Under" stamps, coins, remails, jobs, opportunities. Land, investigations, etc. A General agency. Any service performed. Send \$1.00 fee. Satisfaction guaranteed. R. Archer, Box 687, G.P.O. Sydney, Australia.

**LIQUID** molding rubber, extra thick. Free sample. W. Wooley, 1016-B, Donald, Peoria, Illinois.

**FREE "Franchise Profit Letter"** describes nationwide opportunities. Exclusive distributorships, dealerships, agency operations. Write today. National Franchise Reports, 333 North Michigan, Chicago 1.

**OPPORTUNITY** to earn \$15,000-\$30,000 annually. Franchise protected. Granted on \$12,500 basis. Live at home. No merchandise to buy. Selfemployed. One of most exclusive and noncompetitive businesses in United States and Canada. Send for free explanatory booklet. Harrell and Company, Box 8-D, Louisville, Illinois.

**"HOW to Start a Business"** booklet sent Free! If you know any Trade—go into business for yourself! Learn the 9 easy steps to follow. We've guided 5,000 others to success. Revealing Free Booklet yours for the asking! Write! National Business Consultant, Office JY, Los Angeles 61, California.

**NEWEST** Spare, full-time home business. \$5 to \$10 hour possible. Paint with suede—The finish with touch and eye-appeal. Beautify auto dashboards, signs, radios, toys, figurines, lamps—1001 others. Complete, step-by-step instructions sent for no risk examination. Free details. Coast, JY, Los Angeles 61.

**LIQUID** Rubber. Make flexible molds. Free Sample. Chaney, 1907-C East Rd., Jacksonville 11, Fla.

**MAIL** Order—advertising agency executive reveals sensational no-risk advertising and merchandise methods. Start in office or home—minimum capital—positive profits. Free details: Impact! 3407 Prospect Ave., Dept. 2-7, Cleveland 15, Ohio.

**PLASTERCRAFT** molds, liquid rubber, plasters, flocks, candle supplies. Catalog and manual free. Jayhawk Plasters, Blue Rapids, Kansas.

**REPAIR** Service, full or part time, no selling, free details. Servicecraft, 1412P Adams, Toledo, Ohio.

**REWEAVING** Instructions, Supplies \$2.00. Harris Reweavers, Box 7112, New Orleans 19, Louisiana.

**MAKE** New Greaseless Doughnuts in Kitchen. Sell stores. Free recipes. S. Ray, 3605 South 15th, Minneapolis 7, Minnesota.

**MAKE** flexible molds. Cast plaques, figurines. Free sample. Tooker, 1045-A Fairview, Hamilton, Ohio.

**COSTS** 8c—Retail \$1.00. Automotive product. You manufacture, distribute. Easy! Wilson, Box 505-H, Princeton, West Virginia.

**THEY** hand him \$100! Free Plan "Secret Journal Hidden Dollars." Work home! Publico-R6, Oceanside, California.

**START** Profitable Mailorder House: Proven Products. Magazine. Confidential Details. Barnes, Box 226-A, Portsmouth, Virginia.

**EARN** \$10,000 yearly raising Angora Rabbit Wool for us. Information, 25c coin. American Angora Company, Malta 1, Mont.

**OPERATE** profitable Housing Rental Service from home or office. Very little investment. Detailed instruction guide \$2.00. M. S. Service, 4602 2nd Ave. North, Great Falls, Montana.

**"MAILORDER** Laws and Regulations." Explains necessary licenses, different taxes, legal requirements, etc. \$1.00. Tasker, 1603 Peach Street, Alexandria, Virginia.

**FREE** Catalog. Contains hundreds of businesses, farms and income properties throughout U.S., Canada. Specify type and location desired. Deal direct with owners. U.I. Buyers Digest, 1608 Hillhurst, Dept. PS-1, Los Angeles 27, Calif.

**FREE** sample lesson proves you can learn T.V. servicing in one week. Simplified, chart method saves \$200 on training. Amazing! Write Electronic Engineering, Dept. AC-187, 1038 S. LaBrea, Los Angeles 19, California.

**"EVERYBODY** Likes Candy." Make professionally home. (Our 45th Year.) Ragsdale Candies, East Orange, N. J.

**MAKE BIG PROFITS** clipping newspaper items for publishers. Instructions explain how. Particulars free. National, 81-N, Knickerbocker Station, New York.

**COLORGLAZED** Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries, Grand Rapids, "Minnesota."

**OPERATE** Your Own Merchandise Mail-order Business. Everything furnished! C. Mann, Woodcliff Lake, New Jersey.

**DO** You Want To Be A Motorcycle Dealer? My Firm Will Floor-Plan On Very Low Deposit Street And Scrambler Motorcycles. Enclose \$1.00 Cost Handling. Literature Etc. Importers, Box 508, Needles, Calif.

**PROTECTED** Territories. 200% Profit. "No-Kro" protection lasts. Stops battery and cable corrosion. Liberal supply \$1.00. Guaranteed. No-Kro Company, Chanute, Kansas.

**100% PROFIT.** No investment. Stamp brings details, samples. Miller, Box 584, Brooklyn 1, New York.

**LIQUID** Marble—Brushed! Sprayed! Mold novelties, tile! Particulars free. Marbelizing Service, Edwardsville, Illinois.

**WHOLESALE** Prices. Free Information. National Wholesale Service, Box 397, Buffalo 5, New York.

**MAKE** \$46 From Square Foot Plywood; Jigsaw necessary. Free Information. Woodarts, P-7, Bridgewater, Massachusetts.

### 38 MONEYMAKING OPPORTUNITIES

**SELL** Titania Gems: far more brilliant than diamonds. Catalog 10c. Diamonite, 2420-S 77th, Oakland 5, California.

**DETECTIVES**—Work home—Travel. Experience unnecessary. Detective Particulars free. Write. Wagoner, P-125 West 86th, New York 24.

**MAKE** top money collecting Snakes, Lizards, Turtles, Toads, Frogs. We pay guaranteed prices. Details 25c. Biological Exchange, Dept. 15f, Box 5302, El Paso, Texas.

**BUY** Wholesale! 30-80% Discounts! Appliances, Gifts, Typewriters, Tools, Watches, Sporting Goods, Jewelry, Cameras, Housewares, etc. Consolidated Distributors, Clifton 11, New Jersey.

**MEN** and women wanted to start home business in spare time with little table-top rubber stamp machine. Easy to earn up to \$9.80 an hour without previous experience. Full particulars. Free by mail. Send postcard to Roberts, 1512 Jarvis, Room CR-3-S, Chicago 26, Illinois.

**60% PROFIT** Cosmetics \$25 day up. Hire others. Samples, details. Studio Girl-Hollywood, Glendale Calif. Dept. 1177H.

**"50 NEW** Home-Business Ideas" booklet Free. Coast Industries, A7C, Los Angeles 61.

**HOTTEST** Mail Order Plan Ever! Sell Photos, Films, Art Novelties. Huge proven profits! Free Details! Ampro, Dept. 2, 429 South Western Avenue, Los Angeles 5, California.

**THEY** hand him \$100! Free Plan "Secret Journal Hidden Dollars." Work home! Publico-R6, Oceanside, California.

**VENDING** Machines—No Selling. Operate A Route of Coin Machines And Earn Amazing Profits. 32-Page Catalog Free. Parkway Machine Corporation, Dept. 19, 715 Ensor Street, Baltimore 2, Maryland.

**DIRECTORY!** Where to obtain Free merchandise, books, literature, other valuables! Directory, \$1.00. National, P.O. Box 606, Redwood City, California.

**EARN** Extra Cash Address Advertising Postcards. Box 586, Glendale, California.

**START** A Buying Service, buy wholesale thousands nationally advertised products. Make big profits selling at sizeable discounts. Postcard brings details. American Buyers', Hertel Station, Buffalo 16-O, N. Y.

**MAKE** \$5,000 yearly sparetime raising mink, chinchillas, nutria, etc. Free booklet reveals proved plans. Write: Pura, 588 Mt. Pleasant Road, Toronto 2, Canada.

**HOME-business** pays Big! Start Spare Time and grow with our help! We guide you every step of the way in any business you may choose. Free Details, write National Business Consultants, Office A7C, Los Angeles 61, Calif.

**WE** Pay \$3.50 lb. Grow Mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We have over 25,000 customers. Free Book. Washington Mushroom Ind., Dept. 179, 2954 Admiral Way, Seattle, Wash.

**\$100.00 WEEKLY** spare room. Raise redworms soilless way. Odorless. Charlie Morgan, Box 116C, Bushnell, Florida.

**\$100.00 WEEKLY** Spare Time With A Tape Recorder! Proven Facts Free! Dixie-Land Publishers, Asheboro 8, N. C.

**FREE** Book "505 Odd Successful Businesses." Work Home! Pacific-35c, Oceanside, Calif.

**MAIL ORDER IDEAS, SUGGESTIONS, TECH-**ods. \$1.00. Box 4066, Wichita Falls, Texas.

**LEARN** Technical Metaphysics and insure your future. Easy, inexpensive correspondence course. Simplest method known. Diploma. Write: Premier College of Technical Metaphysics, 2532 McKenzie St., Vancouver 8, B.C., Canada.

**DOLLARS** Every Day! Amazing Magic Mailorder Plan. Setup Free. Miller, Box 588-A, Oshkosh, Wisconsin.

**BIG** Money raising fishworms and crickets. Free Information. Carter Farm-11, Plains, Georgia.

**OPERATE** local advertising agency. Sell your ideas. We show how. Lewel Plans, 1015 Patton, Arlington Heights, Ill.

**SPARETIME** Repeat Profits Taking Magazine Subscriptions, Special Offers. Cassell Agency, Boynton Beach 7, Florida.

**AMAZING** successes through franchises! Become exclusive franchise holder your territory. Information rushed. National Franchise Reports, 333 North Michigan, Chicago 1.

**MAKE** money writing easy-to-sell newspaper features. Guaranteed method \$1. Pine Agency, Birch Harbor 1, Maine.

**MAKE** money in Electronics. Course, Parts, Tools \$30.00. Literature free. Stegatronics, Colchester, Conn.

**MEN—Women!** Start Money-Making Plastic Laminating Business at home in spare time. Material that costs 11c brings back \$2.58. No canvassing or selling but mail orders bring in \$20 a day. Write for full particulars Free. Rush name on postcard to Warner, Room CL-3-S, 1512 Jarvis, Chicago 26, Illinois.

**FREE** Introduction copy to "New Horizons" for homeworkers. Shields Publications, Box 164S, Miami 38, Florida.

**\$30-\$60 WEEKLY** sparetime, addressing envelopes at home. Instruction manual \$1, refundable. Reiss, 210 Fifth Ave., Suite 1102-R, New York 10.

**MAKE** money clipping newspaper items for publishers. Complete plan. Newscraft, PS-983-E, Main, Columbus 5, Ohio.

**\$35.00 WEEKLY** addressing envelopes. Instructions \$1.00 Refundable. Adservice, Spring Valley, New York.

**SELL** imports by mail order. List of 50 foreign exporters and manufacturers, including items suitable for mail order. Send \$1.00. Dalley, Old Minor Road, Terryville, Conn.

**"SPARETIME** Profits", ideas, plans, opportunities! Liberally illustrated. \$1.00. Phillip Ellis, Star Rt., Cass Lake, Minn.

**FREE** Folio "\$5,000-\$45,000; Unlimited Vacations." No merchandise. Unknown! Work home—sparetime! Haylings—\$16, Carlsbad, Calif.

**MAKE** Big Profits clipping newspaper items for publishers. Instructions explain how. Particulars free. National, 81-N, Knickerbocker Station, New York.

**NEW** Magazine Shows You How to make your mail order ideas pay. Sample copy, 10c; 12 issues, \$1. Mail Order Institute, 2639-B7 Howard, Chicago, Illinois.

**FREE** literature of money making opportunities. Unique Universal Trades, Box 5516, Chicago 80, Ill.

**UNLIMITED** opportunity to earn more money at home; \$50 to \$200 weekly, spare time, no selling. Complete folio \$1. Plushman, Dept. 58, 210 Laurel Ave., Janesville, Wisconsin.

**BIG** money raising fishworms. Detailed instructions \$1.00. Pleasant Valley Farm 1, Winterset, Iowa.

**RARE** Samples. Ideas. Catalogues. Wholesale. 10c. National—D-591, Truth Consequences, New Mexico.

**MONEY** With Your Camera. 300 Very Best Markets, With Prices Paid For Your Photos, Plus, Five Tested Plans For Free Lance Photographers. Also Associated Booklets, Catalogs, Obtainable Free, \$1.00. Dave Whitney, Front St. Cascade, Idaho.

**EARN** money in spare time. Letter signs, trucks, etc. Do It Yourself Lettering Outfit contains two sizes master letters and numerals, 1 lettering brush and instructions. Complete Kit Postpaid \$4.95. The Farrell Company, Dept. PS-1, 734 N. Long Ave., Chicago 44, Illinois.

**WHOLESALE!** Sell yourself—sell neighbors Aluminum Awnings: Beautiful baked enamel finish. Write: Groff, Box 10254, Tampa, Florida.

### 38A BUY IT WHOLESALE

**BUY** Wholesale! Discounts to 80%! Appliances, Cameras, Sporting Goods, Housewares, Watches, Tools, Clothing, etc. Buy-Rite, Hawthorne 8, New Jersey.

**DIRECTORY!** Where to obtain Free merchandise, books, literature, other valuables! Directory, \$1.00. National, P.O. Box J-606, Redwood City, California.

**WHOLESALE** Catalog! Discounts to 80%! Clothing, Appliances, Tools, Watches, Housewares, etc. Midwest, PM-156, Pontiac, Illinois.



**WHOLESALE 30-80% Discount Appliances, Watches, Typewriters, Jewelry, Cameras, Housewares, etc. Catalog \$1.00. Refundable First Order. John Peterson, Southport, Florida.**

**BIG Multicolor Wholesale Catalog!** Housewares, appliances, clothing, silverware, cookware, luggage, binoculars, radios, phonographs, cameras, recorders, projectors, typewriters, shavers, sporting goods, toys, tools, sewing machines, watches, jewelry. Name brands. Huge discounts. Postcard: Selbyco, Decatur 170, Illinois.

**ELECTRIC Guitars, amplifiers, wholesale. Free catalog. Carvin, PSW, Covina, California.**

### 39 FORMULAS, PLANS, ETC.

**FORMULAS—All kinds. Latest products. Literature free. Kemico, Park Ridge 15, Ill.**

**FREE Formula Catalog. Anything analyzed reasonable. Western Chemical, Salem, Oregon.**

**62 FORMULAS, Household Products \$2.00. C. O'Reilly, Box 531, Oshawa, Ontario.**

**LATE Modern Manufacturing Formulas List Free. Chemical Service, Martville, New York.**

**ANY Formula \$3.00. Catalog—Manufacturing Treatise 10c. J. Belfort, 192 N. Clark, Chicago 1.**

### 40 PLASTICS

**LEARN Plastics Fabrication For spare time income. Low cost home training now available. Write for free booklet. Interstate Training Service, Dept. D-2, Portland 13, Oregon.**

**LAMINATORS 'job' out your larger work. 10x12 only 65c. Write Lieco, Box 66, College Point, N. Y., for price list.**

**PLEXIGLAS—Any thickness—Clear—Colors—Cut to size—Clear Rods—Tubing. McClarin Plastics, P.O. Box 168B, Hanover, Pennsylvania.**

**LAMINATING Supplies. Price List Free. Solomon, 46 Cornhill, Boston 8, Mass.**

**PLEXIGLAS, Fiberglass, Polyester, Epoxy, Acetate, Vinylite, Styrofoam, Acrylite. Instructive Wholesale-retail catalog—Free. Gem-O-Lite, 5529 Cahuenga, North Hollywood, Calif.**

**NEW Liquid Casting Plastic, clear, colors. Embed real flowers, coins, photos. New Manual shows fine things you can make at home and sell at big profit. Send 25c. Castolite, Dept. H-102, Woodstock, Illinois.**

**PLASTIC Supplies—Liquid Glass, Steel, Rubber. Catalog 25c. Gel, Box 261, Union, N. J.**

**PLEXIGLAS, Square foot cost, 1/16"—\$1.20; 1/8"—\$1.52; 3/16"—\$1.86; 1/4"—\$2.21; 3/8"—\$3.23; 1/2"—\$4.36. Colors add 10%. Send 15% for postage. Aristocrat Plastics, 23-25 Sussex Ave., Newark, New Jersey.**

### 41 CHEMISTRY & PHYSICS

**ATOMOTRON, model atom smasher, \$14.95. 3-in-1 Electromagnet, \$14.95. Send 25c for literature. Atomic Laboratories, Inc., P. O. Box 343, Berkeley, California.**

**CHEMICAL Curiosities! Chemical Puzzles! Chemical Games! Chemical Novelties! All, only \$1.00. National, P.O. Box 606-J, Redwood City, California.**

**EXPERIMENTERS: Terrific Bargains! Catalog 25c. Hagenow Laboratories, 2414 Clarks, Manitowoc, Wisconsin.**

**ILLUSTRATED Catalog: Chemistry, mineralogy, biology 20c. Tracey Laboratories, Evanston, Illinois.**

**NEW Idea chemical and apparatus kits for home experimenting, photo-scales, microscopes, chemicals, biologicals and laboratory supplies in small quantities. Catalog 25c. Established 1931. John H. Winn, 124-P West 23rd Street, New York 11, N.Y.**

**CHEMICALS and apparatus for industrial, analytical and private laboratories. Catalog 25c. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N.Y.**

**60 PAGE Booklets! "Beginners Chemistry," "Chemistry," "Physics," "Relativity," "Light," "Astronomy," "Electricity," "Radio," "Useful Tables," "Scientific Oddities." 10c Each. Franks, 3121 South Racine, Chicago 8.**

**CHEMISTRY—Science magazines. Literature free. "Lankton," Box 5126-D6, Lansing 6, Mich.**

**AMAZING New Book of Science, Experiments, Formulas, and Catalog of Laboratory supplies. Only 25c. National Scientific Co., Dept. PS-7, 500 West Road, Lombard, Illinois.**

### 42 HELP WANTED

**JOBS on ships and yachts going to foreign countries. Davenport Seamens Service, GPO Box 1354, New York 1, New York.**

**JOBS On Ships! Experience Unnecessary. Transoceanic, Box 494, Baltimore 3, Maryland.**

**FREE Information, American, Overseas Jobs, Men, Women. Write Transworld, Dep't. B, 200 West 34 Street, New York.**

**ARIZONA—365 Days Of Resort Living Yearly. Find Your Place In The Booming Land Of Tomorrow. Manufacturing, Industry, Ranching, \$400,000,000 Government Project. All Skills, Trades, Labor, Civil Service. Motorola, General Electric, Aircor, Sperry-Rand, Goodyear, Reynolds Aluminum, Etc. Offer You Unlimited Opportunity. The Following Publications Now Available: 1. "Arizona Jobs" A Complete Analysis \$1.00. 2. "Western Livin'" A Cost Survey \$1.00. 3. "Inside Facts" Our Prospectus \$.75. Act Now—Limited Offer All Three Reports \$2.00. Arizona Employment Consultants, Box 10245, Phoenix, Ariz.**

**COPYRIGHTED Reports on best paying jobs with travel, adventure, promotions. Construction, aviation, shipping, laborers, clerical, trades, supervisory, factory, unusual opportunities. Many types of work. Skilled and unskilled. Foreign and state-side openings for men and women. Only \$2.00 (\$2.25 airmail) including registration-advisory service. Satisfaction guaranteed. Included absolutely free: Special reports on Alaska, Spanish airbase construction, South American opportunities and husband-wife foreign jobs. Research Services, Suite 510-PSO, Meramec Building, St. Louis 5, Missouri.**

**SOUTHERN California job opportunities. Hundreds of employment ads, housing information, airmailed \$2.00 complete. California Enterprises, 610 South Broadway, Suite 623, Los Angeles 14, Calif.**

**FOREIGN, Alaskan, USA jobs!! To \$1500 Monthly! Million Americans, Employed Overseas. Copyrighted Reports. Who to contact for highest paying jobs. Laborers—Trades—Truck Drivers—Office—Engineers—Many Others. 52 Countries—St. Lawrence Project, Spain, Latin America, Northern Projects, Europe. Year Registration—Advisory Service. Application forms. Unconditional Money-back guarantee! \$2.00 (Airmailed \$2.25) (COD's Accepted). International Reporter, St. Louis 1-SV, Missouri.**

**AMERICAN, Overseas Jobs, high pay. Men, Women, Transportation Paid. Free Information. Write Transworld, 200-S West 34 St., New York 1, N.Y.**

**TRUCK drivers, laborers, helpers, craftsmen over \$1000.00 monthly far northern bases. Also information South America, Spain, Alaska, etc. For foreign job listing send \$1.00. Universal, 1111 Commerce Bldg., St. Paul 1, Minnesota.**

### 43 AGENTS WANTED

**YOUR own business—Suits \$1.50; Overcoats 65c; Mackinaws 35c; Shoes 12 1/2c; Ladies' Coats 30c; Dresses 15c; Enormous profits. Catalog Free. Nathan Portnoy Associates, 605-J West 12th Place, Chicago 7.**

**AGENTS—300% profit selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 1217-E West Newport, Chicago.**

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Thirty years' experience in all kinds of flying—including almost two hours in the heart of a hurricane in 1945—has made me a firm believer in reserve horsepower! It means plenty of power for carrying extra loads when needed. It also means added safety, reliability and economy when cruising at 50 to 60 percent of full power. It means power for sudden emergencies, providing a welcome sense of security.

This need for reserve power is basic. In addition to modern aircraft, look at automobiles and look at outboards. Under modern traffic conditions, economical reserve horsepower properly used spells safety.

#### **MULTI-CYLINDER, IN-LINE DESIGN**

As an airline pilot, I appreciate Mercury's slim, efficient, multi-cylinder, in-line design—particularly as compared with large twin-cylinder outboards. My Mark 75's 6 cylinders give me the smooth, overlapping power flow of an aircraft engine, and instant starts with 6 cylinders firing in every crankshaft revolution. I get an added safety factor because the reciprocating parts are lighter and stronger for the loads they carry than those used in large outboards with fewer cylinders. This permits the allowable RPM to be very high, so high that the normal cruising speed need only be half the maximum allowable RPM. This again is aircraft practice.

#### **SENSIBLE ENGINEERING**

I first became interested in Mercurys when I saw one disassembled and was able to study its construction—and, believe me, I found engineering that made sense! Drop-forged alloy-steel connecting rods and crankshaft, drop-forged aluminum pistons heat-treated to the strength of steel, low piston speed that reduces power losses and increases engine life...all factors a pilot, especially, can appreciate. The electrical system on my Mark 75, as on all Mercurys, is completely waterproofed and beautifully engineered. It has no rotating copper, no brushes, no commutator, no voltage regulator to cause trouble in our salt-water atmosphere—or result in "forced landings."

#### **FULL JEWEL POWER**

Another thing that impressed me about Mercury outboards (and a feature missing on others) was antifriction ball and roller bearings on *all* heavily loaded friction points—just as in transport aircraft engines.

#### **COMPACT DESIGN**

Even though I am used to the compactness characteristic of aircraft, I was pleasantly surprised at the way I could pack my Mark 75 in the trunk of my car. And, being multi-engine minded, I found that, if I wanted to at a future date, I could mount two Mark 75's side by side, thanks to the beautiful, narrow, compact aerodynamic design.

Being balance minded and knowing the importance of proper trim, I like the low, close-coupled center of gravity with respect to the transom of the boat, which makes my boat handle better. This engineering detail impressed me no end, because I know aircraft handle better when in proper trim, and that goes for boats as well. Still, for all its compact power, nothing handles easier than my Mark 75. One hand does it: a single-lever control for electric starting, acceleration, forward and reverse...and Mercury Ride-Guide Steering does for outboards what power steering does for cars.

#### **ECONOMICAL CRUISING**

As a trans-Atlantic flier, I have always been interested in cruising range—and that, too, is important in my boat, especially when I carry a precious cargo such as my family. If there is anything that can match Mark 75 economy at any cruising speed, I haven't seen it. I *know* it actually uses less fuel than large twin installations.

With all the things that I have mentioned above I cannot help but say that Mercury is the best buy for my money. Where can you get more power per cubic inch, more horsepower per pound, more miles per gallon regardless of size and as much horsepower per dollar as you can with this Mercury Mark 75? For sheer cruising pleasure I suggest you drive it before you buy anything! What could be sweeter than this 6!

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**12 MODELS—6 TO 60 HORSEPOWER**  
**ONLY MERCURY GIVES YOU A CHOICE OF**  
**TWINS, FOURS AND SIXES!**  
**Only 10% Down—Up to 24 Months to Pay!**

Ask your Dealer  
for a FREE  
Boat Ride  
Demonstration!





DEATHS  
PER  
DAY

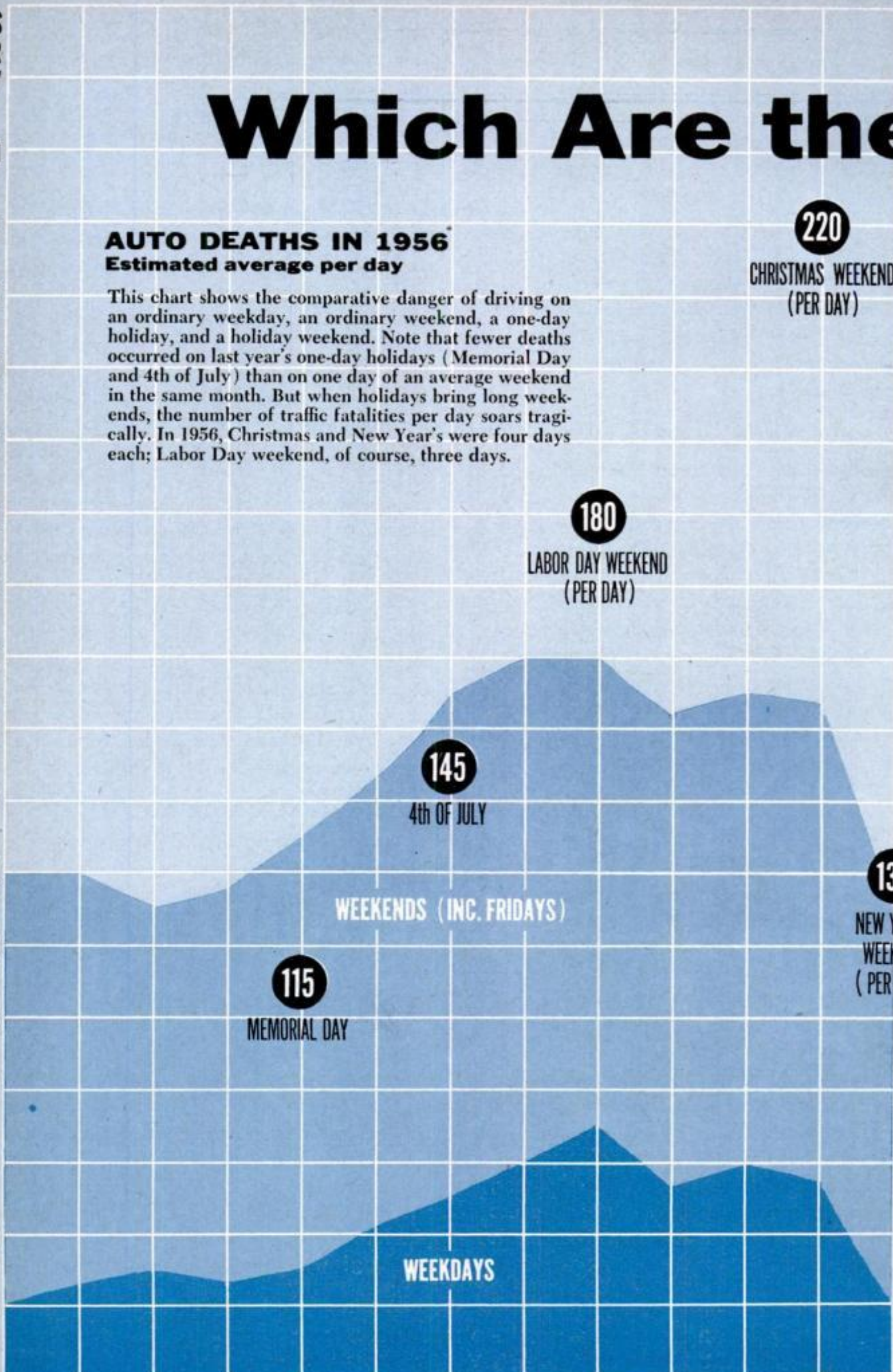
# Which Are the

## AUTO DEATHS IN 1956\*

Estimated average per day

This chart shows the comparative danger of driving on an ordinary weekday, an ordinary weekend, a one-day holiday, and a holiday weekend. Note that fewer deaths occurred on last year's one-day holidays (Memorial Day and 4th of July) than on one day of an average weekend in the same month. But when holidays bring long weekends, the number of traffic fatalities per day soars tragically. In 1956, Christmas and New Year's were four days each; Labor Day weekend, of course, three days.

230  
220  
210  
200  
190  
180  
170  
160  
150  
140  
130  
120  
110  
100  
90  
80  
70



220

CHRISTMAS WEEKEND  
(PER DAY)

180

LABOR DAY WEEKEND  
(PER DAY)

145

4th OF JULY

WEEKENDS (INC. FRIDAYS)

115

MEMORIAL DAY

WEEKDAYS

130

NEW YEAR'S  
WEEKEND  
(PER DAY)

JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. '57

Adapted from data of National Safety Council and U.S. Office of Vital Statistics



# Deadliest Days?

*The 4th of July this year falls on a Thursday—which gives you a chance for a four-day weekend. It also gives you a far greater than normal chance of being killed in an automobile accident*

**By Max Gunther**

**I**F YOU'RE planning an auto trip this 4th of July weekend—or any other long holiday weekend—be on guard. You will be up against hazards worse than any you're likely to meet on a non-holiday weekend. The last time Independence Day stretched into a four-day weekend, in 1950, more than 600 people were killed or fatally injured on the nation's highways. This time, there will be roughly 30 percent more cars on the roads.

July 4th is one of five major holidays—the others are New Year's Day, Memorial Day, Labor Day and Christmas—when traffic accidents rise to an abnormal peak. Just how abnormal can be seen in some of last year's records.

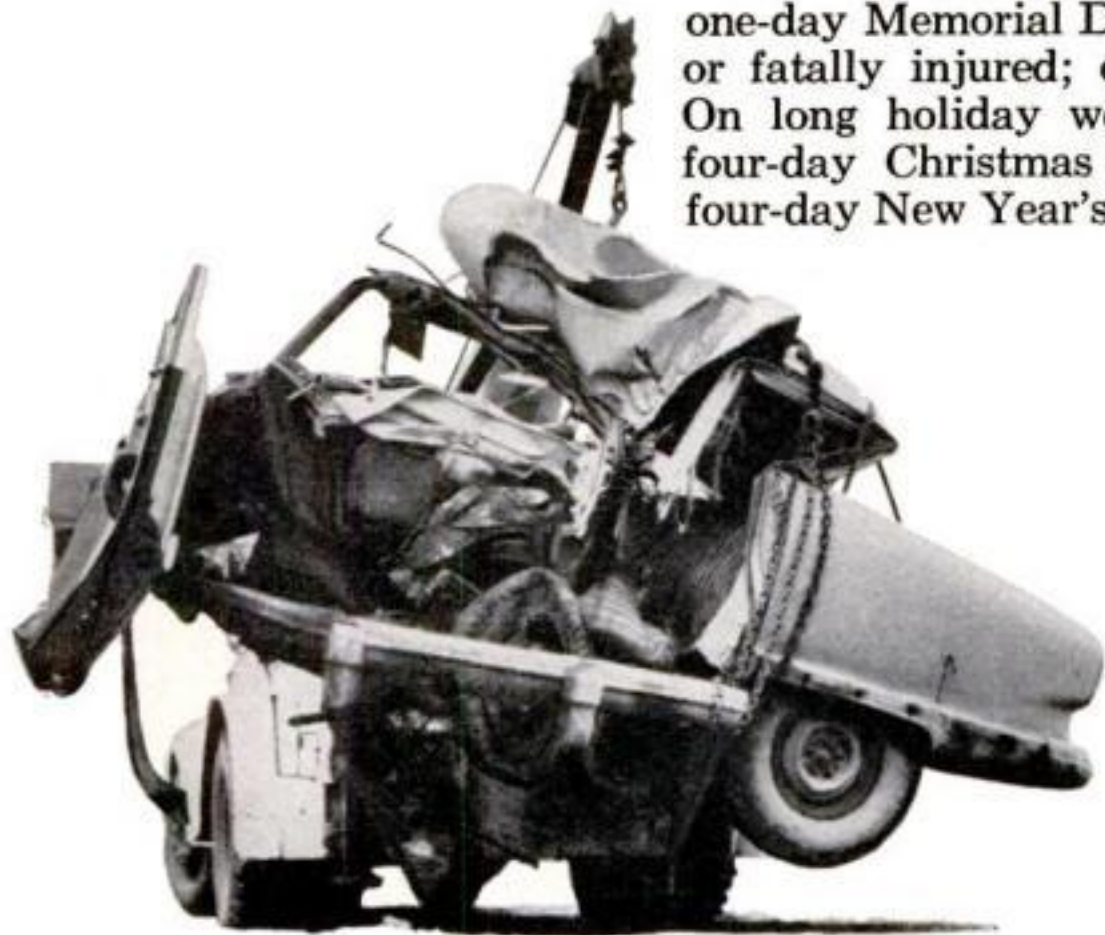
According to the National Safety Council, 434 people died in auto smashups during the three-day Labor Day holiday in 1956, and about one-third more died later in hospitals. Total: about 540. If this period had been made up of three normal September weekend days, the Safety Council estimates, the toll would have been only 475; and during a similar span of weekdays, it would have been less than 300.

The other 1956 holidays produced these tolls: Over the one-day Memorial Day holiday about 115 people were killed or fatally injured; on the one-day July 4th holiday, 145. On long holiday weekends the figures rose sharply. The four-day Christmas holiday took a total of 880 lives; the four-day New Year's weekend added more than 500 fatalities.

What causes these staggering death counts? "The most important reason," says John Larson of New York University's Center for Safety Education, "is the sheer number of cars on the road." When a holiday lasts three or four days, more people than ever take off on all sorts of missions that would not fit into a standard weekend.

"A holiday releases a lot of pent-up travel," says an executive of Allstate Insurance Co. "All year you've been hoping to visit your folks in the next state, and the holiday gives you your chance."

Ernest Rubin, statistics professor at the American University, adds that most of the major holidays are associated with "special behavior patterns" that cause mass migrations. "Memorial Day, for example, is frequently a try-out period for a presummer vacation," Dr. Rubin wrote last year in the *American Statistician*. "Labor Day is usually the last weekend of summer vacations. The return of children from





## ***“You’re trying to get to some distant place fast***

camp and adults from resorts at this time creates excessive motoring difficulties.”

**The most dangerous holiday** of all, Christmas, is the traditional time for visiting home and family—come hell or high water, or three feet of snow. On the other hand, the New Year’s holiday, despite its alcoholic reputation, is one of the least hazardous. It is a time for parties near home rather than distant travel. “Maybe, too, people are scared into safe driving by the Christmas toll of the week before,” suggests a Safety Council official. “Or maybe, by the time the new year dawns, most of the drunks are laid up with hangovers.”

Not only are there more cars on the road during a holiday, but a far greater proportion of them than usual are in the hands of non-professional drivers. Says Paul Jones of the Safety Council: “The really skilled drivers, the truckers and others who earn their living at the wheel, shrink to insignificance in holiday travel. Both in raw numbers and in percentages, there are more bad drivers on the road.”

Another reason behind the holiday tolls is the tendency of people to drive too far. “A lot of holiday driving is a race against time,” says William Corgill, of the Association of Casualty & Surety Companies. “You’re trying to get to some distant place, and naturally you want to make it fast enough so that you can spend some time there before starting back. The result is that you push yourself too hard.” Fatigue sets in; your whole driving ability deteriorates; and, though you may not realize it, suddenly you’re a very dangerous driver.

**Another danger:** It’s likely that, on a holiday journey, you’ll be driving with a car full of distractions. Children become restless on a long auto trip; and this, com-

bined with the mounting fatigue of the parents, can end in a collapse of discipline. As a result, the driver is in trouble. If the children fight or throw toys in the car, his eyes and mind are distracted from the road. On top of this, his irritation at the kids puts him in a dangerous emotional state for driving. Small mistakes or discourtesies by other drivers may make him seethe with rage, and his own driving may become progressively less courteous—and less safe.

**A further hazard** of long trips is the likelihood that your car will be more heavily loaded at the rear than usual. If you are used to driving alone or with a single front-seat passenger, you’ll find that your car handles differently with your children and in-laws in the back seat, and with the trunk loaded. Proportionately less weight is on the front wheels. Combined with the greater total weight of the car, this means that your brakes will

be less effective and that the car won’t take curves as easily as usual. “Many a smashup,” says Corgill of the Casualty & Surety Companies, “has happened because the driver of a heavily loaded car judged his safe braking distance or curve speed according to his experience when the car was lightly loaded.”

The heavy rear-loading of a holiday-bound car may also interfere with your vision by tipping the hood upward. Many safety experts, among them Prof. A. R. Lauer of Iowa State College’s Driving Research Laboratory, have been worried in recent years by the trend toward lower cars. The lower a driver sits, these researchers say, the less complete is the view he commands of the road around him and ahead of him. The skyward tilt of your hood ornament will add to this difficulty. It may also upset the subconscious trigonometry you use to gauge

### **Where and When Holiday Accidents Happen**

ACCORDING to a National Safety Council Survey of two three-day holiday weekends—Christmas 1955 and Labor Day 1956—accidents were most frequent in the early hours of the weekend—55 to 58 percent in the first 30 hours of the 78-hour periods under study. Apparently, it’s getting there that is most hazardous, not the race to get home. Most accidents occurred when driving in rural areas—82 percent over Labor Day, 72 percent on Christmas. The worst hours: between six and nine p.m.



## **enough to spend some time before starting back."**

how close you are to the next fellow's fender.

Still more vision trouble may result from the typical holiday pile of miscellany on your rear-window shelf. The Safety Council counts blocked rear vision as a significant cause of accidents.

**How can you safeguard yourself** against all these hazards on your next holiday trip, short of staying home? In addition to the everyday warnings against speed, alcohol, and mechanical failure, safety experts offer some advice specifically for holidays.

First, if your plans for a trip call for more than 350 miles' driving in a day, put it off until you have more time. Guard against fatigue at all costs. If possible, have your wife or someone else spell you briefly at the wheel at least once every hour and a half. During these breaks, close your eyes.

**To avoid drowsiness**, don't eat any big meals; instead, stop frequently for light snacks. Keep your collar open and your belt unbuckled. Dr. Lauer even advises taking off your shoes and driving in stocking feet. He adds that it's also helpful to vary your speed every 15 minutes and to talk with your wife or other passengers. But warn them not to point out passing sights to you.

The Safety Council warns that all but flat, light objects should be kept off the rear shelf. Tall objects will block your rear vision; heavy ones may slide off in a sudden stop and injure someone. To overcome the tilt caused by extra weight in the rear, put a few extra pounds' pressure in your rear tires or deflate your front tires slightly. If possible, feel out the braking and curve-holding action of the loaded car before you get onto a major highway. Test it on the streets near your

home or in some area with little traffic.

**And the children?** No one has yet discovered a way to keep them still on a long trip. However, you can soothe their restlessness by the same formula you use to ward off fatigue: frequent stops for light snacks. During these stops, relax discipline as much as is feasible; this will take strain off both you and the kids. Let them chase each other and shout if they want to, and if the nature of the snack stop makes it possible. "When we take children on a group trip," says a New Jersey school principal, "we try never to stop at any place where they'll be required to sit still and quiet. If we don't allow them to let off steam, sooner or later there's an explosion."

Jones of the Safety Council suggests that it's also a good idea to know the signs of a dangerous car, and when you're near one to double your caution. If a car is ostentatiously decorated with coon tails and other ornaments, look sharp; there's a chance that the driver has some show-off in him, and this could come out in his driving. If a car's rear window is blocked by boxes or folded coats, sound your horn firmly before you pass—and then pass slowly. If a car weaves markedly from one side of the traffic lane to the other, it's possible that the driver is having fatigue trouble. Watch out for him; he's unpredictable.

Jones, who is in charge of gathering the Safety Council's holiday statistics, also works on the regular pre-holiday death forecasts. "We're sometimes accused of scaremongering," says Jones. "If we do scare people with these forecasts, it's with the intent of making them more cautious drivers. Believe me, nothing would make us happier than to have our forecasts proved too high." **END**

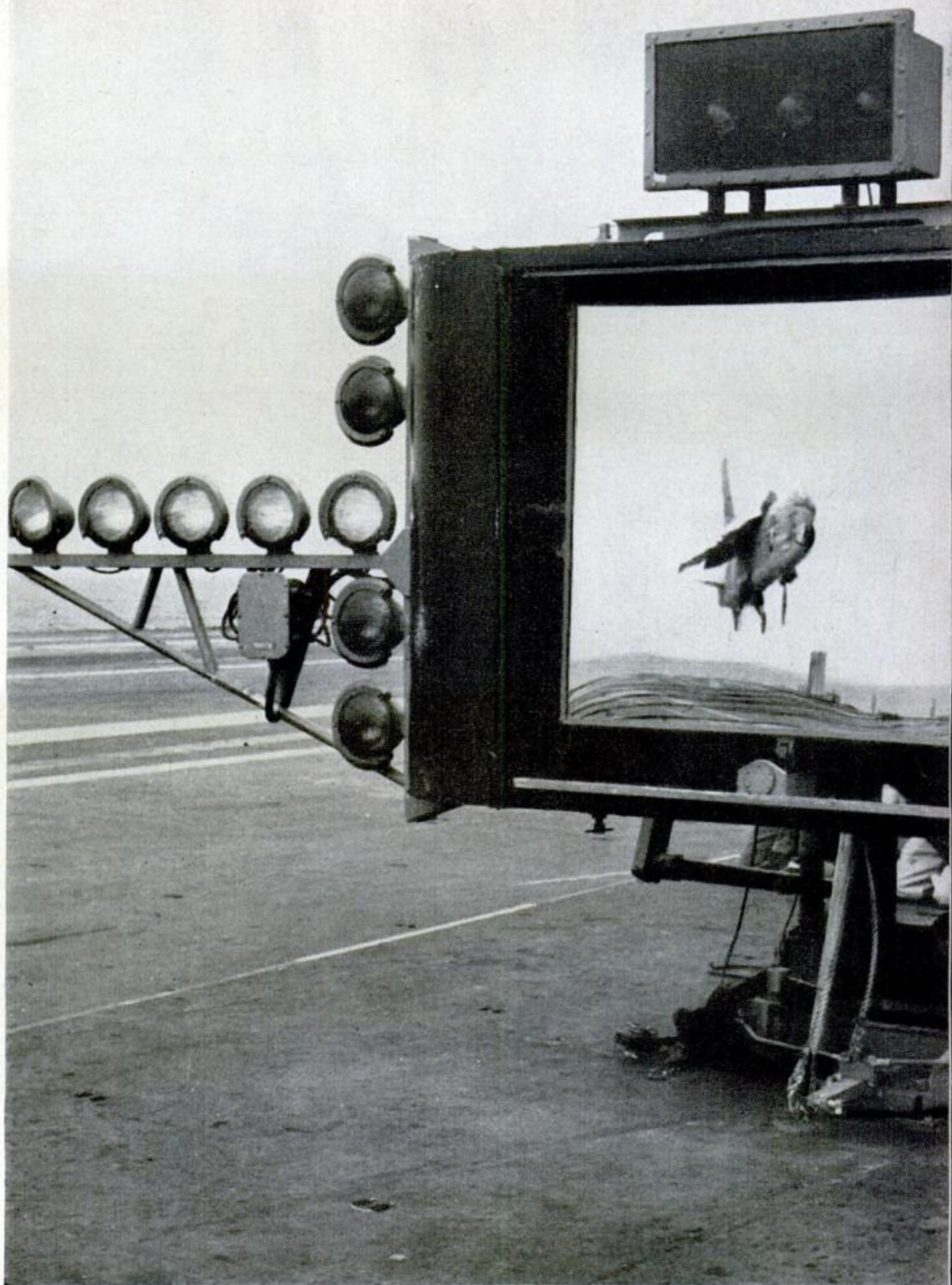
### **Hints for Safe Holiday Driving**

DRUNKEN drivers, speeders, and unsafe cars should be, respectively, in bed, in jail, and in the mechanic's shop. Assuming that neither you nor your car fall in these categories, here are nine ways in which you can reduce the hazards of holiday trips.

- Don't drive over 350 miles a day
- Let somebody spell you at the wheel
- Stop often, eat lightly

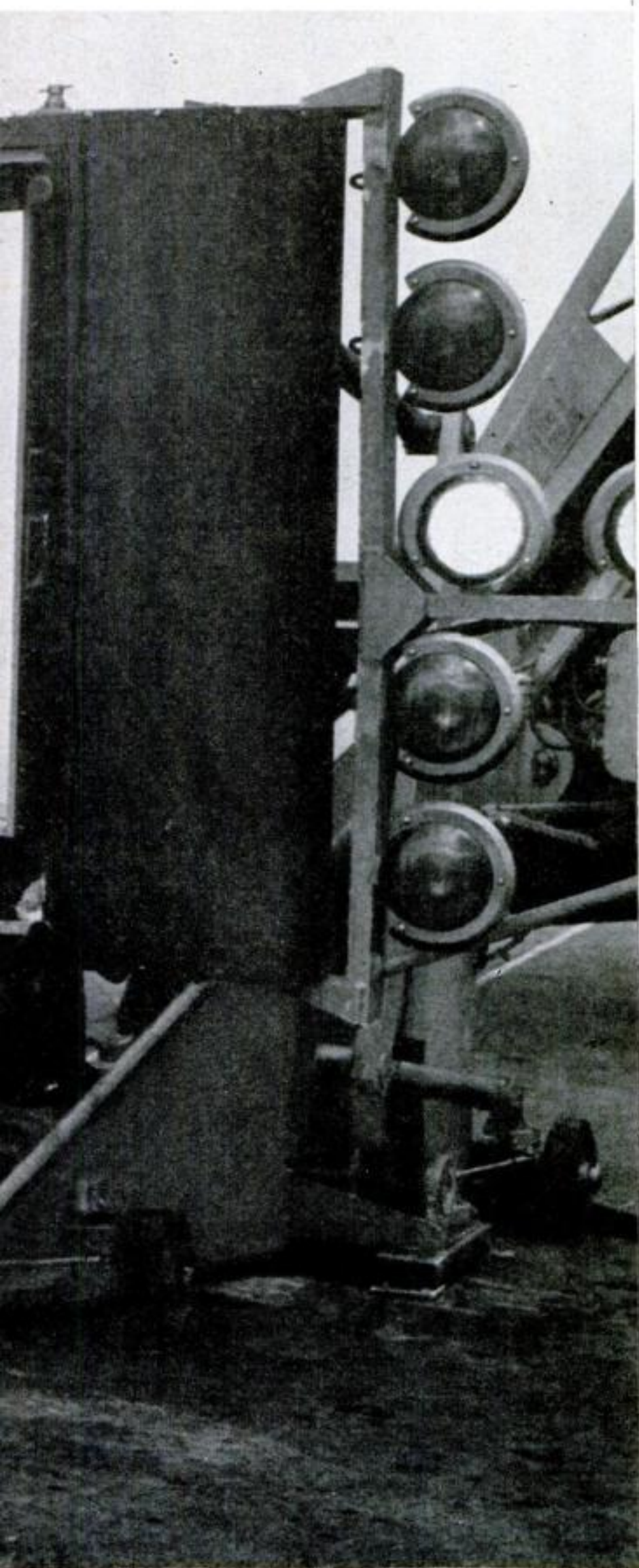
- Remember that a heavy load reduces your brakes' effectiveness
- Get comfortable—loosen your collar and belt
- Keep large objects off the rear shelf
- Allow the kids to let off steam at stops
- Vary speed to avoid "highway hypnosis"
- For better vision with a heavy load, add a few pounds' pressure to rear tires





Reflection of a perfect landing: An F8U Crusader scores a bull's-eye on the approach mirror





as it slams toward the deck at 150 m.p.h.

**Handling our new F8U carrier jets in rough weather is the—**

# World's Meanest Flying

**By Frank Harvey**  
**with photos by W. W. Morris**

**T**HE ocean looked like the foothills of a mountain range. Walls of water, topped by foam, exploded against the bow of the USS Franklin D. Roosevelt, and flung sheets of spray against the windscreens of the jet fighters spotted for the launch.

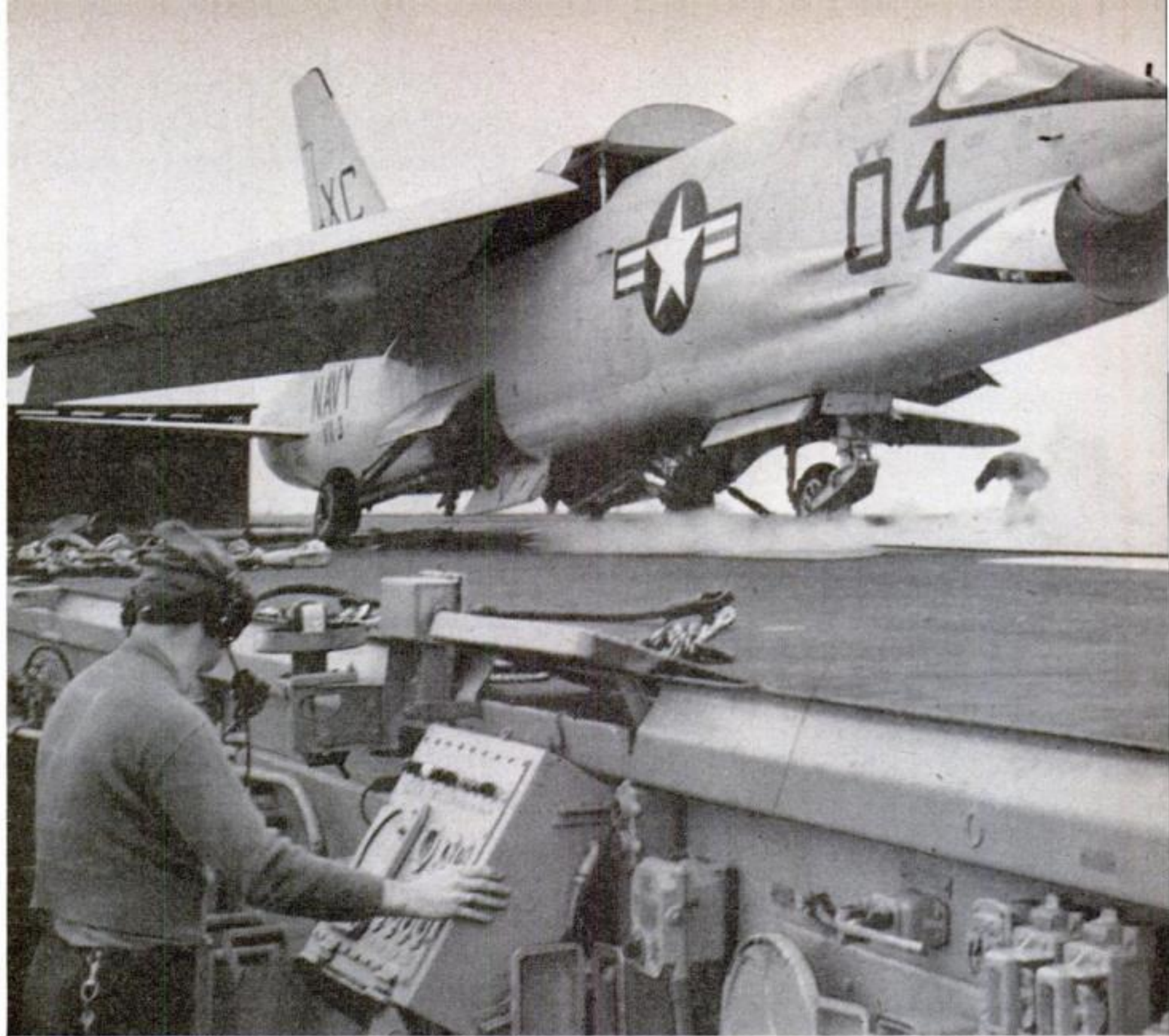
The Navy's second-largest flattop was fresh from a face-lifting (new steam catapults, canted flight deck, and mirror landing system). Her fighters were the hottest hardware the Navy owned: Douglas F4D Skyrajs, Grumman F11F Tigers, and the queens of the show, Chance-Vought's Bendix-winning F8U Crusaders. The pilots were seasoned jet-carrier men of VX-3, the Navy's elite development outfit which specializes in testing new equipment under the most rugged conditions.

*Rugged tests are great, I thought as I clung to the starboard catwalk in the blowing rain. But if these lads take off today, the captain ought to hand out automatic Navy Crosses as they climb into the cockpit.*

No such ceremony was deemed necessary. The bullhorns blared: "Check all wing lines, chocks and loose gear about the deck. Stand by to start jets."

*A sizzling sound* joined the howl of the wind. It shifted to a bottle hum, then went berserk. It was the F8U Crusader on the catapult above me. Dimly, through the spray-clouded windshield, I saw a blurred face in a crash helmet. The face squinted ahead, bent and ap-





peared to be checking the instruments. Then it came stiffly erect against the padded headrest and a hand snapped a salute—the signal to the catapult officer that this pilot was ready to go.

A dynamite crash exploded out of the jet's tailpipe, held steady, and there was a blurred whoosh of steam as the cat flung the Crusader overboard like a toy. The fighter rose steeply in the murk ahead, with power to give away, and turned across the carrier's bow. Other planes moved onto the cat, were fired, and the sky gradually grew full of screeching, hurtling shapes.

**"Let's get aft,"** bellowed Bill Morris, **POPULAR SCIENCE's** photographer. **"They're landing back there already!"**

We scuttled along the catwalk in the gale and took a position near the landing mirror aft of the island. These high-performance fighters were too hot

to be handled by an old-fashioned paddle waver. After watching them come in and hit the deck, you could understand why. They hit, as the pilots themselves admitted ruefully, in a sort of "controlled crash."

I watched an F8U in the groove. It sat up there in the scud like a seagull following a garbage scow. The wing was cranked up out of the plane's body, giving the machine a humpbacked look. Little caster-sized wheels sprouted out of the belly. This flying machine was certainly not hovering. It was coming downhill like a truck falling off a cliff. It was moving 150 miles an hour and trying to hit five little wires—an airfield about 125 feet long—that happened to be heaving and pitching. Heaven knows how much that lad could see through his spray-smudged windscreen.

***The Crusader settled.*** The warning





**FIRE WHEN READY!** Inside the hell-screaming Crusader above, wing jacked up to give the plane high lift, a jet pilot waits tensely for the launch-panel operator in the foreground to push the button.

**VROOOOOOM!** and the Crusader streaks down the flight deck like a balsa model out of a rubber sling-shot. This is the moment carrier pilots fear most. A "cold shot" can put them in the drink in seconds.





Hook man above is racing across the carrier deck to loosen an F8U from its landing wire.

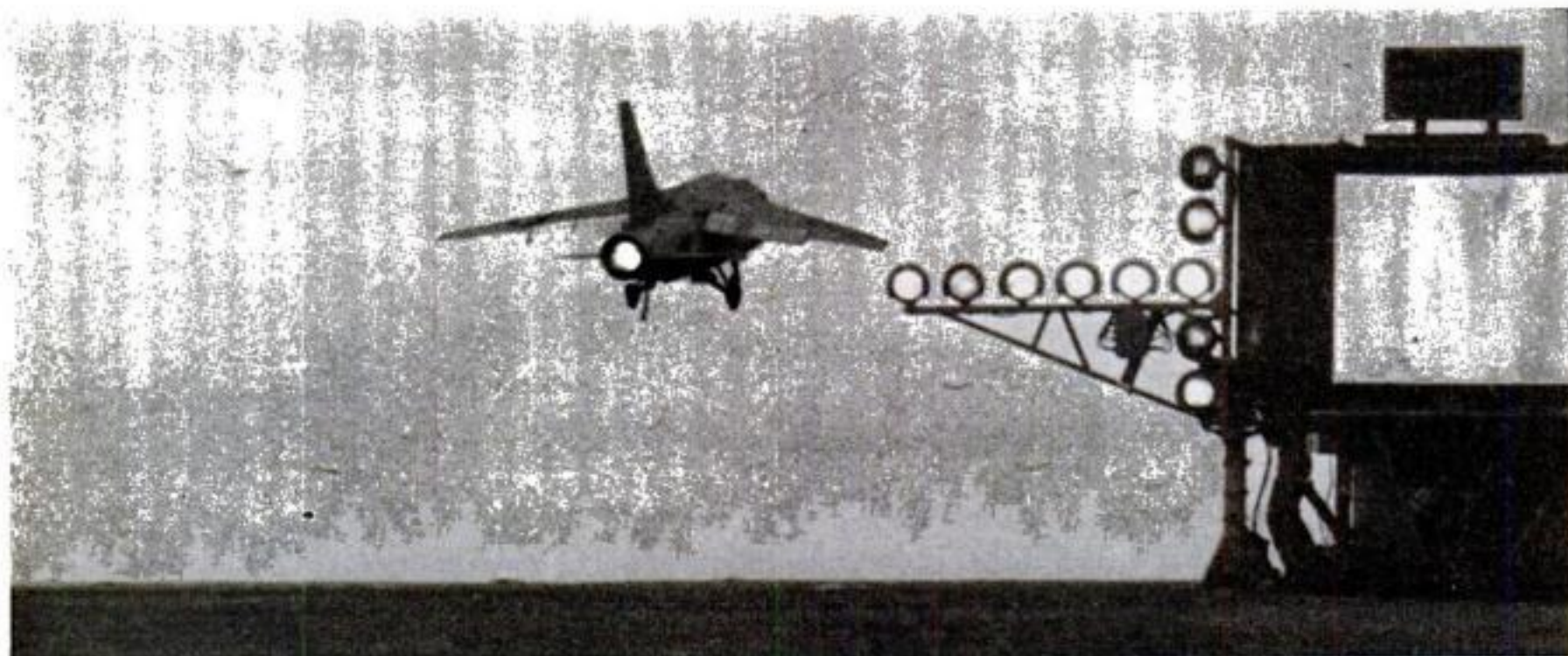
lights on the edge of the landing mirror suddenly began to wink frantically and bloodily red. The pilot was a little slow in reacting. The jet mushed—its tailhook skimmed fearsomely close to the wires—and the Pratt and Whitney engine screamed bloody murder. The jet hit hard beyond the wires, rolled a heartbeat, and plunged over the end of the canted deck. Below the level of the carrier, out of sight, there was a hideous explosion.

*He went in, I thought in numb horror.*

*The poor guy hit the drink and blew up.*

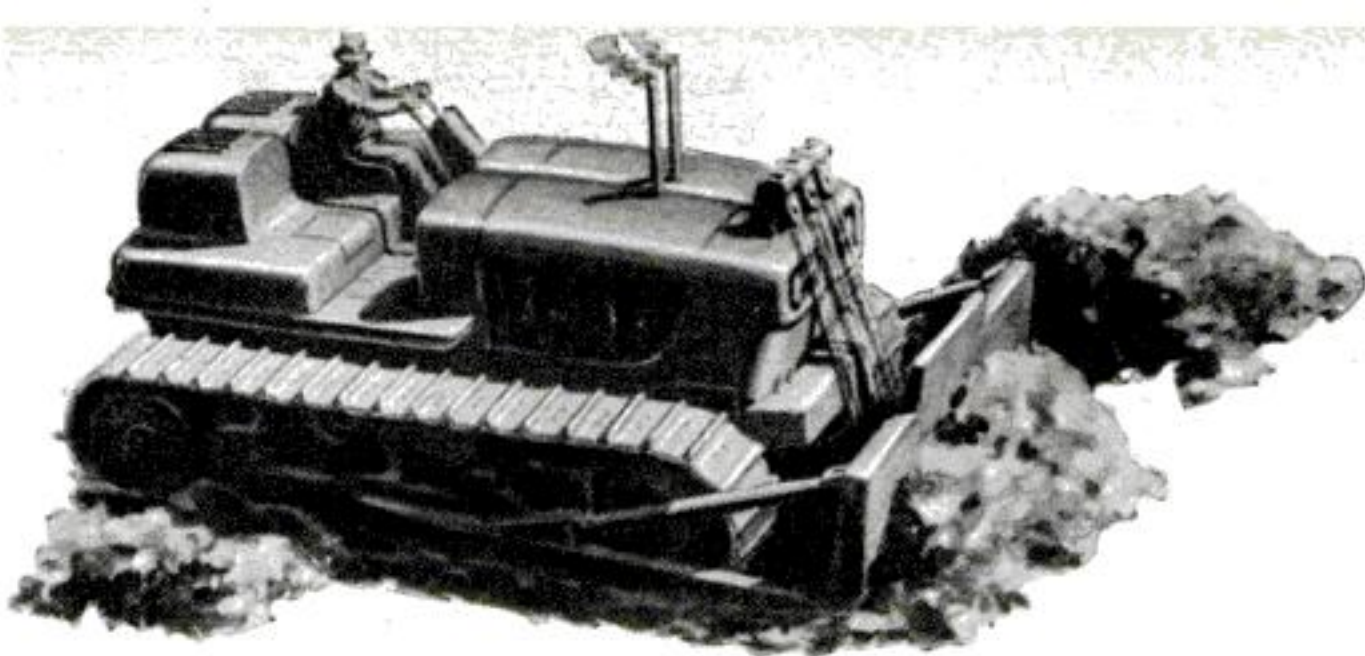
Then the Crusader rose triumphantly, its tailpipe blasting solid orange fire. Afterburner. Sudden application of afterburner had given the pilot the power he needed. Now he was safe, and back in business. A few moments later he came in again, made his controlled crash, was whisked out of the gear by darting deck directors, and motioned frantically forward into position for a second cat shot.

[\[Continued on page 192\]](#)



Orange fire belches from afterburner as pilot who misjudged his approach takes a wave-off.





# The Mechanical Monsters That Build Our Roads

***Machines as big as a house, yet delicately precise in operation, are spinning a web of super-roads across the U.S.A. Here's how to watch the show***

**By Harry Walton**

**S**TARTING right now, you have a front-row seat at the biggest earth-moving show ever put on the road. Under the \$33 billion Federal highway program, men and machines are building 41,000 miles of limited-access roads linking over 200 cities. Drive off in any direction, and you'll probably see part of this enormous job—a river diverted, hills sliced or leveled, valleys filled.

The modern highway makes little compromise with nature. Instead of dodging obstacles, it cuts through them. Along 427 miles of the New York Thruway, for example, there is almost no point where the builders did *not* excavate. They moved about 80,000,000 cubic yards of material—10,000,000 more than were necessary to build China's 1,500-mile Great Wall.

Today, the manual labor necessary to build these roads without machinery doesn't exist, and could not be paid for if it did. Unskilled labor has little place in modern road building.

First to replace muscle on the roads was the steam engine. By 1910 the gasoline

engine was taking over. Today, diesels power all but the smaller machines.

**Engine horsepower is way up.** One twin-engine scraper boasts more than 500 hp. Two-cycle, four-cycle, supercharged and turbocharged engines are in daily use. Next in sight—with much research already under way—are free-piston and gas-turbine power plants.

Construction men are a hardy lot, but modern machines are designed to be run more easily, to cut down fatigue, and to do the work faster. Power steering, power braking, torque converters and automatic transmissions are as common on earth-moving equipment as on autos.

To bear the weight of early steam-traction engines on soft farming ground, designers made wheels bigger and bigger. The crawler idea—an endless track the machine could lay down, run over, and pick up behind—was made practical by a traction-engine builder, Benjamin Holt, in 1904. His tracked engine sparked a revolution in earth-moving equipment. For short-haul excavating, on rocky, hilly or muddy terrain, the crawler is still king.

But today the big-wheel rubber tire is





**SUPERHIGHWAY ABUILDING:** In this early stage, the nearer roadbed has been graded. Now its banks are being shaped. Across the river the cut has just been started. Here is what each machine is doing: 1. Allis-Chalmers bulldozer breaks top

of bank to make slope; 2. Pettibone Speedall loader cleans up dozer-loosened soil; 3. LeTourneau-Westinghouse Tournapull scraper cuts high spots off subgrade, hauls away dirt; 4. Northwest shovel loads blasted rock into a Ken-

hard on its heels—and way ahead when long hauls are necessary. Tires roll faster, turn more sharply, and last longer than tracks. Four-wheel drive, wider rim bases and lower air pressures enable big, deep-cleated tires to pull almost as effectively as crawlers.

*The tractor is handyman* of road building. It may be on crawler treads or

on tires, may have two wheels or four. Superhighway jobs call for big-power machines like the 28-ton, 320-hp. Caterpillar D9 (see above, No. 11), or the 436-hp. twin-engine Euclid TC 12 (above, No. 6). This one is a Siamese-twin rig, in which two units, each with its own engine, torque converter and track, are joined.

Bulldozing may look easy, but it's a





worth hauler; 5. Ingersoll-Rand rotary compressor provides air; 6. Euclid Twin-Power dozer strips soil off rock; 7. Gardner-Denver Air-Trac drills blasting holes; 8. Bucyrus-Erie dragline dredges river bottom; 9. Caterpillar D9 dozers

grade the cut and push-load scrapers; 10. Euclid Twin-Power scraper turns into loading path; 11. Caterpillar scraper with four-wheel tractor loads with assist from a D9; 12. Allis-Chalmers and Caterpillar scrapers returning empty.

complex interaction of brawn and brains. An operator will doze downhill if he can, putting gravity to work for him. He may run several passes until the tractor has dozed itself a slot. This restricts spillage from the ends of the blade, making bigger loads possible.

You'll get a thrill from seeing "float" dozing atop a hill. The dozer makes

enough passes to build up a big load on the blade, then rides the load down over the edge of a slope as steep as 45 degrees.

*Crawlers* are, of course, steered by driving one track while letting the other run free or braking it. But uphill the machine will turn toward the free tread. Downhill that one overruns the driven one and the dozer will steer the other way, a fact that





**ROUGH GRADING IS OVER:** These machines are finish-grading, doing drainage work and placing bridge abutments: 1. Insley backhoe digs storm-drain trench; 2. Mack truck-tractor and trailer

delivers drain pipe; 3. Reo truck with Rex transit mixer brings concrete; 4. P & H crane with bucket fills forms; 5. Bucyrus-Erie clamshell digs for a bridge wingwall (behind rock ledge),

operators can't very well afford to forget.

Even crawlers can get stuck; once the track lugs have dug themselves grooves, the machine may settle on its belly, as helpless as an overturned turtle. Other things the operator must watch out for: tree branches that can snatch the controls away from him; ridges or logs (on which the machine will ride up only to pitch down with a crash); and last but not least,

dynamite left over from some earlier job.

**Shovel loaders** (above, No. 6) are wide buckets that tilt back as they dig in, to scoop up a full load. They can lift high enough to dump into trucks. One kind of overhead loader swings the shovel clear over the machine to dump into a truck behind the operator; it can work in tight spots because it needn't turn around.

A dipper shovel of  $\frac{3}{8}$ -cubic-yard capac-





loading into an International off-the-road hauler; 6. Clark-Michigan tractor shovel removes soil pile; 7. LeTourneau-Westinghouse scraper cuts down high spot; 8. Manitowoc crane drives sheet

piling that will protect concrete forms; 9. Gradall shapes a drainage ditch; 10. Euclid scraper removes surplus material from the roadbed; 11. Allis-Chalmers grader shapes road base.

ity is about the smallest they come these days. The 2½-yard size used to be a big one, but three-, four- and even five-yard shovels are fairly common now (a basic four-yard unit costs \$150,000).

Watch a dipper shovel in action: The jaw comes far back, drops, essays a mighty bite crosswise to the treads. The farther track lifts, and the whole machine tilts toward the load, shudders, and settles back

with a thud as the operator lets go. He tries again, gets a load. The huge bucket rises high, the body swings, and an auto-sized boulder rocks the huge dump truck it falls into. One corner overhangs the truck body; the shovel delicately nudges it farther in. A piece the size of a station wagon lands upright; the monster jaw lifts, pats it down into a more stable attitude.

A dipper shovel (Page 58, No. 4) is com-





**A BRIDGE IS BUILT**, while concrete pavement is poured beyond it. Here are the machines that get busy as the job nears completion: 1. Bay City Cranemobile lays storm-drain pipe; 2. LeTour-

neau-Westinghouse Tournatractor backfills drain ditch; 3. Adams grader smooths surface; 4. P & H wagon crane takes reinforcing off trailer hauled by International truck-tractor; 5.

plex, its operation tricky. To dig into a bank, for instance, the hoist winch (which lifts the bucket) is released to let the bucket fall in an arc around its pivot in the boom. Momentum carries it behind this point, but the operator must stop it with the hoist brake before it hits the boom.

At the same instant he releases the crowd brake, letting the stick slide down

through the boom until the bucket teeth hit ground. To scrape forward horizontally into the bank calls for nice coordination between the hoist line (which will pull the shovel *down* so long as it's behind the shipper drum, but *up* when it's forward) and the retract clutch, which draws the stick up through the boom. He has to use both to keep the bucket in a straight path instead of an arc.





Challenge mixer on Mack truck supplies concrete poured into bridge slab by Lorain Moto-Crane; 6. American Hoist stiff-leg derrick places beams; 7. Buffalo Springfield Kompactor rolls

subgrade; 8. Pettibone grader levels it for placing of forms; 9. batch-mix truck delivers cement, sand and stone to Rex paver; 10. Rex finisher strikes off and smooths road surface.

*The pull shovel* or backhoe (Page 60, No. 1) has its bucket on the end of a stick pivoted at the top of the boom. It can excavate well below its own level. The geometry, reeving and operation of the backhoe are of a fascinating—and nightmarish—complexity.

*Dragline shovels* (Page 59, No. 8) have a long boom, with a pulley, or sheave, at the end, over which runs the hoist line

to a longish bucket. This has an arch-like “handle” at one end. A second line runs from the arch to the bottom of the boom. Hoist and drag lines are on separate drums.

By manipulating the two lines, a good dragline operator (and there are no others) can control the position of the bucket and its penetration of the material, direc-

[\[Continued on page 206\]](#)



# How They're Using Mathematics to Win Ball Games

**Today a big-league club's official statistician is often its Most Valuable Player. Here's how he goes to bat for the team. By Gardner Soule**

Mathematician Roth plans strategy with Dodger manager Alston before the game. ►

*"I've heard of fish that couldn't swim;  
Of cats that hated cream;  
But never have I seen a man  
Who was a real and rabid fan  
Who couldn't tell a manager  
Just how to run his team."*

*—George Phair, in an  
old Reach baseball guide*

ALLAN ROTH, 39, like uncounted millions of men, is a real and rabid fan. He therefore passionately desires to tell a manager just how to run his team. He is unlike generations of frustrated fans in one respect:

He does.

The manager Roth tells is Walt Alston. For Roth is team statistician of the Brooklyn Dodgers. Ten years ago, Roth, who had never played anything but sandlot ball, and was just another fan who had pored over the statistics, decided he was what the Dodgers needed. So he talked Branch Rickey into believing he could provide Brooklyn with new, secret and revealing statistics that would help win ball games.

The use of figures to help win games is the newest thing in the long history of (1) statistics and (2) baseball. The science of statistics was born 300 years ago when the French mathematician Blaise Pascal tried to help his friend, Chevalier de Mere, a gambler, lay his bets successfully. Pascal tried to figure out the

chances of drawing an ace or rolling a six, and he ended with the foundation of the laws of probability.

Baseball was born 100 years ago, or about 200 years after Pascal. From the start, almost every play on the diamond was recorded, and probable occurrences in given situations quickly became clear. Al Roth today does for Walt Alston what Pascal did for Chevalier: Roth points out the probabilities, to take one example, of Alston's winning in a given park on a given day, with a certain pitcher.

In Roth's 10 years at Brooklyn, the Bums, long famous for futile striving and near-basement finishes, have had their golden era: No second-division finishes (the only National League club without one), one third place, three seconds, six flags. And, in 1955, their only World Series win.

Roth, a modest man, avoids credit for all this like a Dodger hitter ducking a bean ball. But by mid-summer, many a major-league team, following Branch Rickey's footsteps, will have hired its own statistician. This season, figures are being used as never before in an all-out effort to win baseball games.

Other club owners, having watched Roth pull magic numbers out of his black looseleaf notebook over the years of the Brooks' great victory record, think there may be a connection.





There may well be. Last year, with hitting down, and the team trailing on July 4, July 10 (the All-Star game), and Labor Day, Roth's figures were undoubtedly one reason for Walt Alston's order to his batters:

"Walk."

The Dodgers did. On the last day of the season, they won the pennant, over Milwaukee, by one game. They had won only 93 games, lowest total for any Dodger championship team this decade. Twenty-five wins were one-run decisions.

En route to the flag, Dodgers Snider (with 99) and Gilliam (with 95) led the league in walks. Altogether, the Dodgers walked 649 times—almost exactly half as many times as they got hits.

You could argue (Roth doesn't) that the Dodgers walked to the '56 pennant.

Still he says, "I couldn't point to a single game and say I helped win it. I don't know if I've hurt or helped."

**The first fan in history** to grab himself a place by the manager's elbow makes his achievement sound simple.

"As a fan," he says, "I got interested in baseball statistics.

"What interested me most—this is what shaped my whole career—was that I could not find out just what figures did interest me the most.

"Some figures that should have been kept were not there.

"It wasn't that there were not enough baseball statistics. There were—shelves and shelves of them. I didn't want to add more. But I did feel some were missing. So I collect some statistics never recorded before. I try to give them to Walt Alston in simple form, as things he can use. It might help, here and there."

Roth won't tell what all his secret statistics are. That would be informing his competition. But he will discuss a few of his figures.

One—that explains his advice to the Dodgers to walk—is what he calls a man's "on-base average."

"I get it," he says, "by lumping a man's walks together with his hits.

"The point is this: A man who hits .300, but rarely walks, does not get on base as often as one who hits, say, .260 but walks often.

"Now every walk is a potential run. Every man who walks is a contributor to a potential rally."

**Another figure** Roth keeps that he will discuss is Dodger batting averages under different conditions—such as when the bases are empty or when teammates are on the sacks. Sandy Amoros, he discovered, gets positively inspired when he sees a fellow Dodger on base. He hits a good 100 percentage points better when he has a chance to drive in a run. A man who walks, Roth says with a grin, can



pep up Amoros just as much as a man who smacks a hefty outfield single.

Another reason for Roth's urging his Bums to collect all possible free passes is to be found in the trends in baseball statistics over the past quarter century.

These statistics show that the number of home runs hit each summer is up. In 1930, in both major leagues, there were 1,565; in 1956, the total was 2,294—an increase of 40 percent. (And a home run drives in men who walked as well as those who hit.)

Strikeouts are also more common: 1930, just 7,936; 1956, up to 11,507. More men are swinging for the circuit. (Make a pitcher throw strikes to you—or don't swing. Maybe you'll walk—not fan.)

**Total hits are down:** In 1930, there were 25,508; in 1956, only 21,653. (A base on balls is thus more valuable than ever.)

Batting averages are shrinking. In 1930, there were 20 major leaguers hitting .350 or better; in 1956, just one—Mickey Mantle, with .353. In 1930, there were 56 hitters at .300 or better; in 1956, only 28. (With BA's down, a man increases his value vastly with a hefty on-base average.)

Roth does not even say that his influence is responsible for the Dodgers' walking to victorious games and seasons. But there is no argument whatever about the fact that the Dodgers, for the last five years, have led the National League in total walks.

**They finished first** in four of those years, second in the other.

Roth's on-base average, one of his new and revealing figures, may, as he puts it, have helped, here and there.

Other figures not kept before Roth came along have to do with what, he says, fans want to know about most—and ask him about most.

This is whether the hoary, popular opinion that right-handed batters are better against left-hand pitchers is true.

And whether left-handed hitters are really better against right-hand pitching.

"When I was a fan," Roth remembers, "I never could learn why Player Jones, a righty, was benched against a right-handed pitcher. Never once did I see figures that told me about Jones's hitting against righties.

"So, at Brooklyn, I keep separate bat-

ting averages for our hitters against righties and lefties. What have we learned? The overall rule—that right-handers are better against left-handed pitching—is true. And left-handed batters are generally better against right-hand hurling. But many players are exceptions. Perhaps 25 percent. So many that individual records are necessary.

"Pee Wee Reese, a right-hander, has hit better against righties in seven or eight of his last 10 years. In 1956, low for him, he batted .256 against righties, only .195 against southpaws."

**Another question fans ask**, over the years, Roth says, is this: "Should I bet on the team ahead by July 4 to win the pennant?"

Roth snorts: "Not in this league! Not unless you've got a runaway race. That's just a date somebody picked—the halfway mark. It doesn't stand up. Milwaukee was first on July 4 last year, but we won." The figures: Only 57.1 percent of the National's top teams on July 4 go on to win.

In the American, the odds on the July 4 leader are better: In 18 of the last 21 seasons, the July 4 top-spot occupant has become the champion. But this may be due to a peculiarity of our era that may some day end: the domination of the A. L. by the New York Yankees. The Yanks took 15 of those pennants, and led on July 4 in 13 of their flag-winning years.

The Dodgers themselves one year stumbled disastrously over the idea that their lead meant the pennant. That was in 1951. In mid-August, with only six weeks to play, they were 13½ games ahead. So they pulled Roth off his job of analyzing every play of theirs, and sent him to watch instead the Cleveland Indians and the New York Yankees, the Bums' most probable opponents in the World Series.

**The Brooks dribbled away** their whole margin, however, and ended in a tie with the New York Giants. Bobby Thomson hit a home run and the Giants won the playoff.

Never since have the Dodgers had Roth off his job.

Like all statisticians active today, Roth owes his profession to the man the figger filberts call the father of baseball: Henry Chadwick. Abner Doubleday, who may

[Continued on page 224]





VESPA

**Cheaper than walking  
and lots more fun:**

# All About the New Scooters

**M**OTOR scooters aren't new to this country, but Europeans, hungry for low-cost transportation, have showed us how practical they can be. With crowded highways, tough parking problems, and high insurance rates Americans too are finding that the little two-wheelers have a lot to recommend them. Not least is a price tag so low that even a third-hand car is costly by comparison.

All scooterists are crazy about their machines. (Those who aren't don't remain riders.) Typically, they are not crash-helmet and kidney-belt types. Among enthusiastic scooterists in metropolitan New York are attorneys, doctors, a woman who carries her show dog on the machine, an art director, and a TV writer.

In Europe, entire families ride—Junior on the floorboard, baby in a basket, and Mother on the jump seat. Sports riders in this country are mostly either single or newly marrieds (scooters are so conducive to romance that there is a fast turnover between these categories).

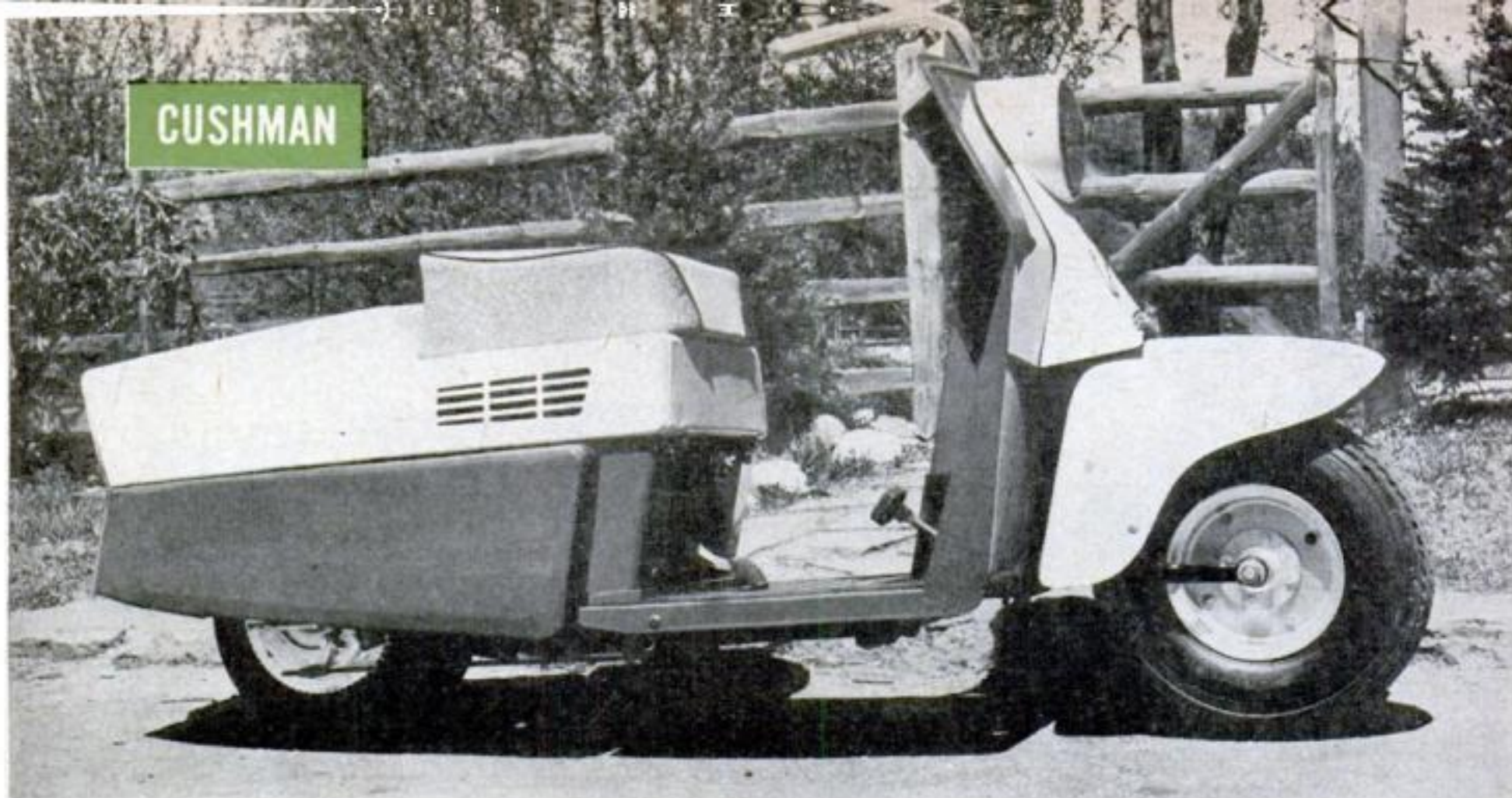
Parking on a dime is one of the scooter's big advantages. Commuters and city dwellers alike can slither through traffic that would stall them in a car, and leave their mounts in spaces scarcely big enough for a bicycle. "I park between cars, on some motorist's meter," says one rider. "The only time I get a ticket is when he lets the meter run out."

*What's scootering like?* If you ever had a bike, you know that riding two wheels is altogether different from driving

**TWO WHEELS AND THE OPEN ROAD** are an invitation to go places. The Vespa will carry two riders, roll at up to 50 m.p.h., and travel more than 100 miles on just one gallon of gas-oil mix.



## CUSHMAN



**DETROIT STYLING** in two tones highlights Cushman's new models. Balloon tires and a well-cushioned seat soak up road shocks. An auto-

matic clutch makes learning to drive a cinch. The entire rear deck hinges forward for access to the powerful four-cycle engine, as shown

four—and much more fun. You're part of the machine, not merely a passenger in it. You steer not by the handle bars, but by the seat of your pants. It's a free, easy, pleasant, and highly personal form of transportation.

Visibility is good; there are no posts to obstruct side vision, and you can see behind simply by turning your head. Balance is easy; the machine wants to remain upright, and will do so right down to a slow walk. Above all, scootering is fun. Few things come closer to flying than cresting a hill at a good clip, or banking

around a smooth turn at cruising speed.

**Drawbacks to scootering** there are, of course. You can't do much about bad weather, though the apron on most machines gives some protection against road splash, and you can wear a full-length raincoat. Good riders confess that ice keeps them off the road. Snow, however, is navigable if you know your stuff.

Wet cobblestones, car tracks and loose sand are invitations to skid. Panic braking on such a surface can lock the scooter's rear wheel and throw the machine out of control.

## PRIMA



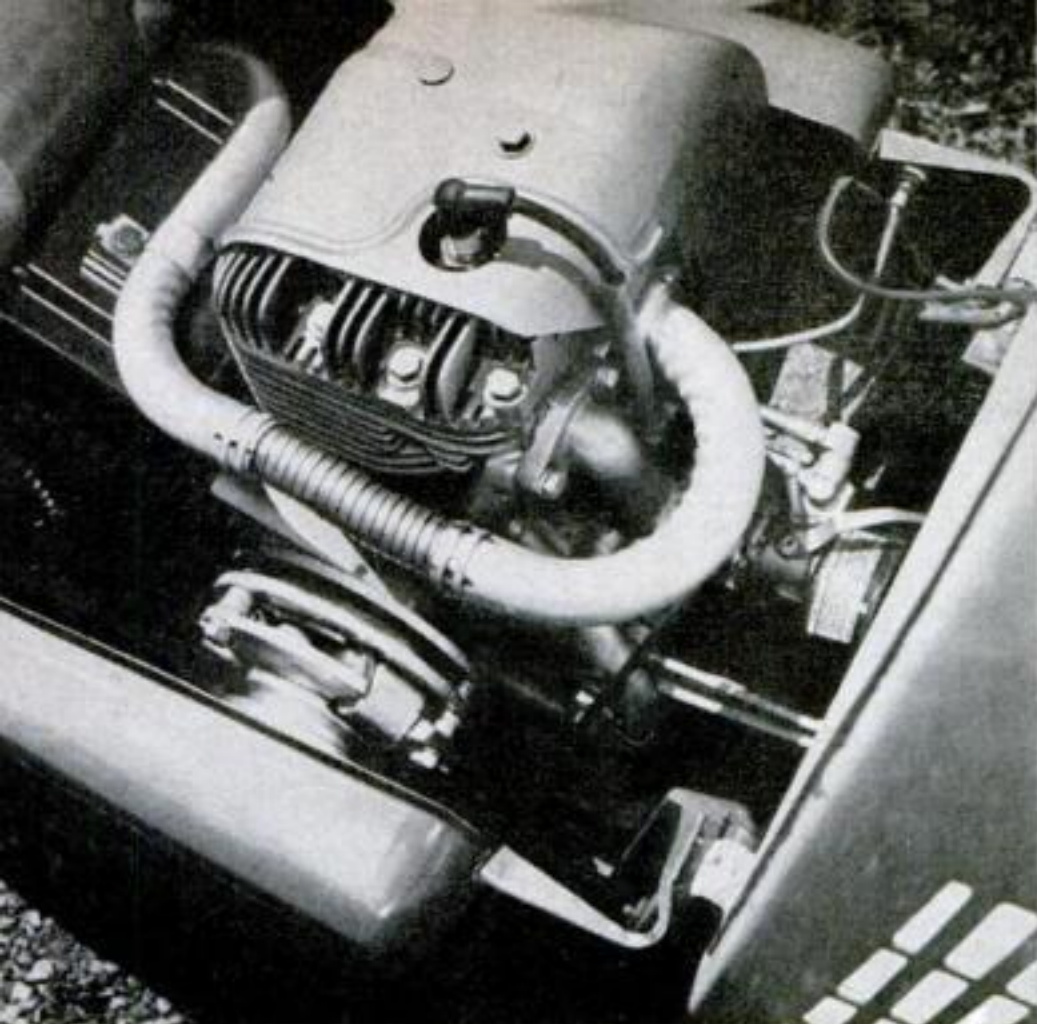
**PUSHBUTTON STARTING** is one of the luxuries of the sleek NSU Prima above. A 12-volt electrical system does the work. With a top speed just under 50, it will cruise at 35 to 45 easily.

## TESSY



**A FLOORBOARD TUNNEL** and horizontal cylinder characterize the Tessa. The 8.5-hp. model has a six-volt battery and starter system. Two luggage carriers and spare wheel are included.





above. Three weights on the driving member of the clutch fly outward as the engine revs up, forcing clutch disk to engage driven member.

Dogs are conservative animals easily outraged by the unconventional and will frisk alongside munching at your heels. You also have to beware of doors opening on the street side of parked cars.

Most auto drivers, admiring or appalled by your temerity, will give you plenty of room. A few may fail to honor the wide margin you'd like to preserve around you. In heavy traffic you can retaliate by nuzzling in along stalled cars and chugging ahead of a whole line of frustrated drivers. The modern scooter, a deft and agile machine, can pick its way through vacation-



**BIG WHEELS** and a 10-hp. two-cycle engine give the Bella 200 a high speed for a scooter—75 m.p.h. It has foot shift, enclosed chains, and a 12-volt electric starter system.

time traffic tangles like a chipmunk through a wood pile.

*You'd expect to jounce hard* on rough pavement, but the plump little tires, well-engineered springing and hydraulic shocks iron out bumps and ripples. Deep potholes, of course, are to be dodged.

Scooters run on pennies; you get from 80 to 130 miles per gallon. A tank filling takes you about 200 miles. Top speed is commonly 50 miles per hour.

*Learning to ride* is easy if you ever pedaled a bike. Although much heavier, a scooter balances more readily at low speeds than a bike. All you have to do is sit straight and not tense up on the handle bars. Common beginner's faults are keeping arms or wrists stiff, trying to steer around instead of leaning into curves, and using feet instead of brakes to stop.

Thanks to an automatic clutch, the Cushman is the simplest to drive. Twist the throttle open, and you're off to a silk-smooth start every time. To stop, simply step on the brake.

Shift boxes on the European machines take a bit more learning but are a delight to the mechanically sophisticated. On a Vespa or Lambretta, you pinch a hand lever to declutch, twist the same handgrip to shift gears. This becomes second nature after a few tries. Constant-mesh gears enable you to shift up or down at lightning speed with never a gnash even in low. Other machines, such as the TWN Con-tesa, have four-speeds and a selector that gets you into neutral from any position at a touch.

*It's a buyer's choice*, more this year than ever before. Importers of foreign machines are opening dealerships in many big cities. The Cushman Motor Works, undisputed king of American manufacturers, with 650 dealers in the country, offers new styling in its Pacemaker and Road King models.

The Cushman is a four-cycle engine that takes straight gas in the tank and is filled with oil to a dipstick mark just like a car. (Foreign two-cycle machines require a gas-oil mix like an outboard.) With Cushman's automatic clutch, it's impossible to stall the engine. A flywheel magneto supplies juice for ignition, a stop-light, head- and tail-lights.

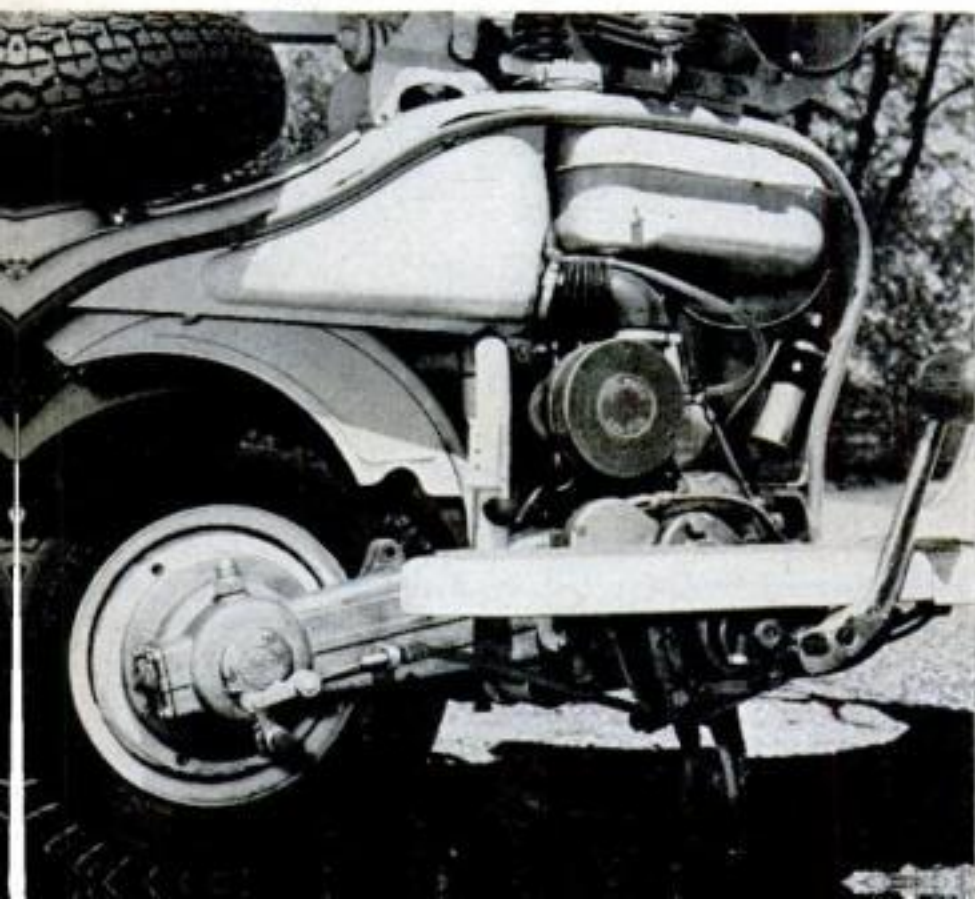
The Road King has a two-speed shift for better getaway and hill climbing. Primary drive is by V belt, secondary drive





You add oil when fueling up a two-cycle scooter. Measuring cup in tank cap makes it easy.

**LAMBRETTA'S REAR WHEEL** is suspended on a trailing arm and torsion bar. Power is transmitted through a drive shaft to bevel gears in the case just outside the rear wheel.



**THERE'S ALWAYS ROOM** to park a scooter. Even much tighter spots than this one between cars will accommodate the midget two-wheelers. A lock on the steering column prevents theft.





to the wheel is by chain. You ride to the staccato but well-muffled bark of the characteristic four-cycle exhaust.

To Cushman's debit must be laid the kick starter, a hangdog affair that has to be lifted after each stroke. The headlight, adequate at pulling speeds, dies to a glimmer when you coast downhill, since the automatic clutch then lets the engine idle. The well-cushioned seat would be better for a spine or ridge at the back to keep you from sliding aft.

**Named for the wasp**, Piaggio's Vespa has a lively 150 c.c. two-cycle engine with a six-plus horsepower punch. A three-chambered muffler holds its exhaust to a polite but busy whisper. (Vespa claims the lowest decibel noise count of any scooter.)

The Vespa's delivered price of \$389 includes a speedometer, pillion seat, steering-column lock and a horn like a Model T's with a foreign accent. Engine, drive train and rear wheel are a pivoted unit; there is neither chain nor drive shaft. Tires are changed by taking them off one side; there are no forks or through axles to wrestle with.

Despite its gracious lines and courtly exhaust, the Vespa has the moxie to go just about anywhere a lively goat could. Rocky trails, rolling meadows and off-the-road camp sites are within easy reach of the Vespisti, as Continental-minded Vespa riders call themselves.

A 125-c.c., 4½-hp. Vespa is sold by

Sears, Roebuck as the Allstate Cruisair. Lacking a few of the amenities that are standard on the 6.4-hp. machine, it sells for correspondingly less.

**Slick engineering** is evident in the Lambretta. Once warm, its superb engine starts at first kick, responds jauntily to the throttle. Like other two-cycle power plants, it's fond of revs, and the constant-mesh three-speed transmission lets you take full advantage of this at all times. Engine, transmission, drive shaft and rear wheel are on a trailing arm, with torsion-bar springing so linked that it stiffens up under increased load.

Speedometer, pillion seat, a clock that works, and white sidewall tires are standard on the six-hp. Lambretta at \$450. A five-hp. machine with fewer luxury features is available from dealers and from Montgomery Ward for a hundred dollars less. Or you can plunk down about \$500 for a Lambretta with a 12-volt battery system and electric starter.

**Horsepower is up** on some other German scooters, such as the Bella (10 hp.) and the Contessa (11 hp.). Compression ratios are as high as 7:1. Some machines have 12-inch wheels and a floor tunnel the rider has to straddle, giving them a motorcycle-like appearance. Starters are available on these and on the NSU Prima, another German machine. This one includes such niceties as a green warning light that comes on when that long-lasting gas supply finally runs low.—Harry Walton.

MOTOR SCOOTERS		TRANSMISSION AND DRIVE	TIRE SIZE	WHEEL- BASE	ELECTRICAL SYSTEM	WEIGHT (lb.)	PRICE <sup>b</sup>
MAKE AND MODEL	ENGINE <sup>a</sup>						
Cushman 722 Pacemaker	19.4 cu. in.; 5 hp.	single speed; chain	4.75" by 8"	54"	magneto	275	\$300
Cushman 725 Road King	19.4 cu. in.; 5 hp.	two-speed; belt and chain	4.75" by 8"	54"	magneto	310	\$335
Lambretta 125 LD	7.5 cu. in.; 5 hp.	three-speed; shaft and gear	4.00" by 8"	50"	6-volt magneto	187	\$350
Lambretta 150 LD	9 cu. in.; 6 hp.	three-speed; shaft and gear	4.00" by 8"	50"	6-volt <sup>c</sup> magneto	194	\$450
NSU Prima	9.15 cu. in.; 6.2 hp.	three-speed; shaft and gear	4.00" by 8"	49"	12-volt battery, electric starter	220	\$462
TWN Tessa Luxus	7.6 cu. in.; 7 hp.	three-speed; dual chain	3.50" by 8"	50"	magneto	240	\$420
TWN Tessa Super	9.15 cu. in.; 8.5 hp.	three-speed; dual chain	3.50" by 8"	50"	6-volt battery, electric starter	262	\$452
TWN Contessa	12.2 cu. in.; twin-piston; 11 hp.	four-speed; dual chain	3.50" by 10"	52"	12-volt battery, electric starter	328	\$527
Vespa	8.88 cu. in.; 6.4 hp.	three-speed; gear	3.50" by 8"	45"	6-volt magneto	202	\$389
Zundapp Bella 150	8.9 cu. in.; 8 hp.	four-speed; dual chain	3.50" by 12"	51½"	6-volt battery and generator	302	\$389
Zundapp Bella 200	12 cu. in.; 10 hp.	four-speed; dual chain	3.50" by 12"	51½"	12-volt battery, electric starter	322	\$499

<sup>a</sup>All engines except Cushman are two-cycle, and have kick starters unless otherwise specified under electrical system. Cushman engines are four-cycle.

<sup>b</sup>Prices of foreign machines are FOB New York or other

entry port, except Vespa's, which is delivered price anywhere in U. S. A. Cushman prices are FOB factory at Lincoln, Neb.

<sup>c</sup>Lambretta 150 LD is also available with electric starter.



# Studebaker's Economy Car: Where They Saved the Money

*A little chrome off here and  
a gimmick gone there adds up  
to a solid saving of \$224.59*



**By Devon Francis**

**F**OR 20 years, thousands of motorists have asked irritably, "Why don't they build something like the old Model A Ford?" Well, last month the Studebaker people announced a car having a vague kinship with the Model A.

It is *not* a Model A. It weighs 3,000 pounds compared with the Model A's 2,200. It has 101 horsepower compared with 40. It has a fuel pump instead of a gravity-feed tank. It totes six people instead of five.

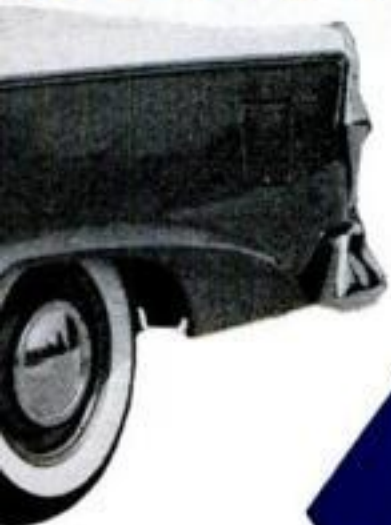
But, like the Model A, it supplies economical transportation. It's easy on gas. And, at \$1,776 for the two-door model, it is the lowest-priced sedan manufactured in the U. S.

The "ADP" (advertised delivered price) of this car is \$220.30 less than that of the lowest-priced Chevrolet, \$214.60 less than the lowest-priced Ford, \$232.50 less than the lowest-priced Plymouth, and \$185.45 less than the lowest-priced Rambler. It's \$224.59 less than the lowest-priced Studebaker Champion.

*The four-door version* of this car, named, aptly, the "Scotsman," with an ADP of \$1,826, undersells the lowest-priced U. S.-made competitive four-door by \$215.88. The station-wagon version, at \$1,995, undersells the lowest-priced U. S.-made competitive wagon (Studebaker-made) by \$386.59.

The ADP includes everything except transportation of the car from the factory at South Bend, Ind., to the dealer, and





**THE CAR'S THE SAME**, but the tinsel is gone. Some differences between the new Scotsman (above) and flashier Champion (left) are obvious. Scotsman's grille is cold-rolled steel, painted aluminum, instead of stainless steel. Chrome is off, hood ornamentation has less flash. Bumper steel is lighter.

any state and local taxes. It even covers that annoying item that has crept into millions of bills of sales—the dealer's "preparation and delivery charge."

Studebaker's Scotsman comes equipped with a manual transmission, a heater-defroster, turn signals and a spare wheel and tire. That's all. The only factory-installed options available to the buyer are an overdrive unit at \$110.40, an oil-wetted air cleaner (\$8.07) and electric windshield wipers (\$9.68). A different axle ratio can be had at no extra cost.

Highest possible factory-approved price on the two-door, excluding transportation from South Bend: \$1,904.15.

With prices of cars reaching for ever-higher plateaus, that's impressive. How

has Studebaker managed to achieve it?

*It was no miracle.* The engineers simply went over the Champion with a fine-tooth comb and removed everything that wasn't welded on. The car is austere. There's no glitter. Enamel has replaced chrome; aluminum paint has replaced stainless steel. Cloth-backed plastic is substituted for expensive fabrics on seats, roof and walls. The engine choke is manual, not automatic. The spare lies flat on the trunk floor instead of standing in a well at the side.

Satisfying a buyer's whim on hardtops, two-toning and fabrics is expensive. So, there are only the two sedans and the wagon. The cars come in just three colors, and those are solid—gray, green and blue. The interiors come in exactly one combination—black and beige.

Of the 180-odd subtractions and mod-

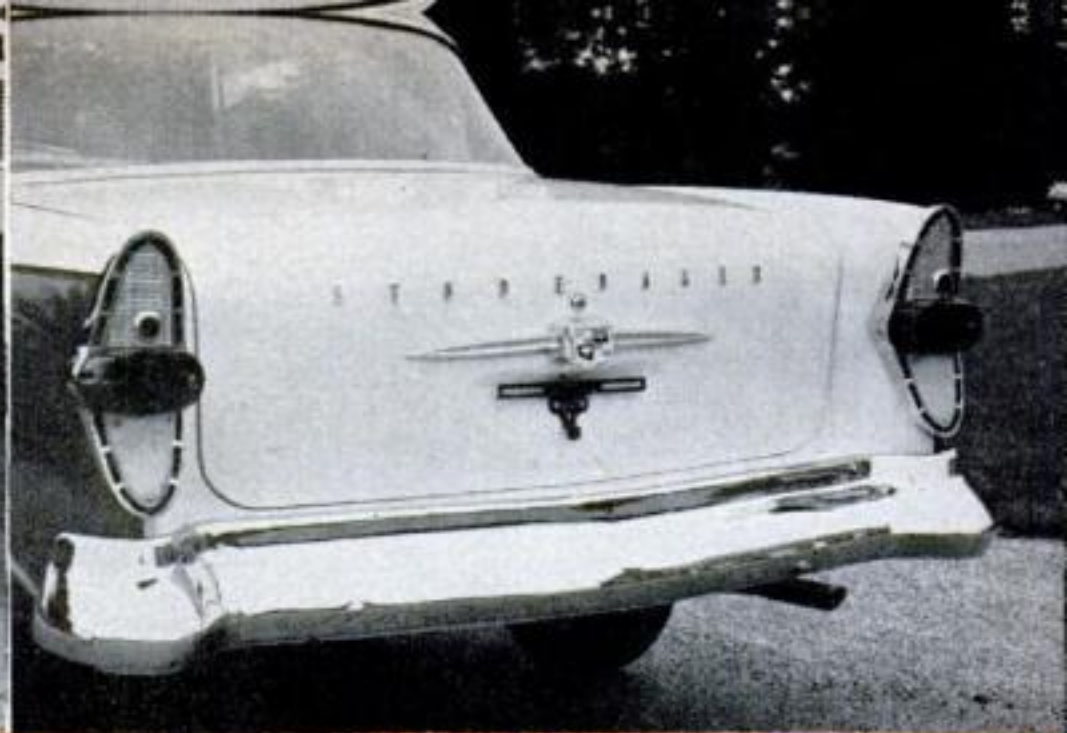


**ECONOMY STATION WAGON** was changed most. All of the new models have painted wheel disks.





**CHAMPION**



**SCOTSMAN**



**REMOVE THE GLITTER** and little refinements, and presto!—there's Studebaker's Scotsman. Reading left to right on picture panels above:

Scotsman's instruments are simpler, carpeting and trim cloth durable but cheaper, deck-lid decorations sparse, trunk austere (it holds the

### Facts on Studebaker Scotsman

**Engine:** L-head six; displacement 185.6 cu. in.; bore and stroke, 3 x 4.38 in.; hp., 101 @ 4,000 r. p. m.; torque, 152 lb.-ft. @ 1,800 r. p. m.; compression ratio, 7.8:1; gasoline requirement, regular.

**Chassis and running gear:** wheelbase, 116.5 in.; front tread, 56.7 in., rear tread, 55.7 in.; rear axle, 3.54:1, 4:1 optional; total weight (est.) 3,000 lb.; brake-lining area, 147.4 sq. in.; turning-circle diameter, wall to wall, 42 ft.; tire size, 6.40 x 15, station wagon 6.70 x 15.

**Transmission:** three-speed manual shift.

**Dimensions:** (outside): height, 59.8 in.; width, 75.8 in.; overall length, 202.4 in. Inside: headroom front, 36.5 in., rear, 35.5; leg room front, 44, rear, 39; hip room front, 59.5, rear, 59.

**Capacities:** fuel, 18 gal.; oil, 5 qt.; water, 11 qt.

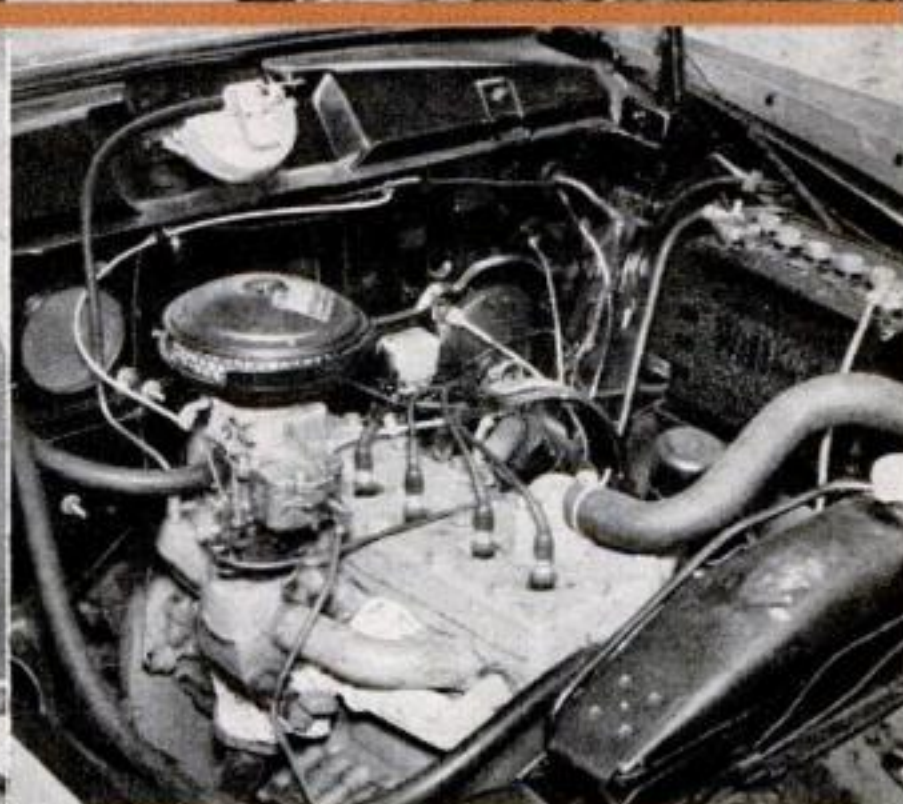
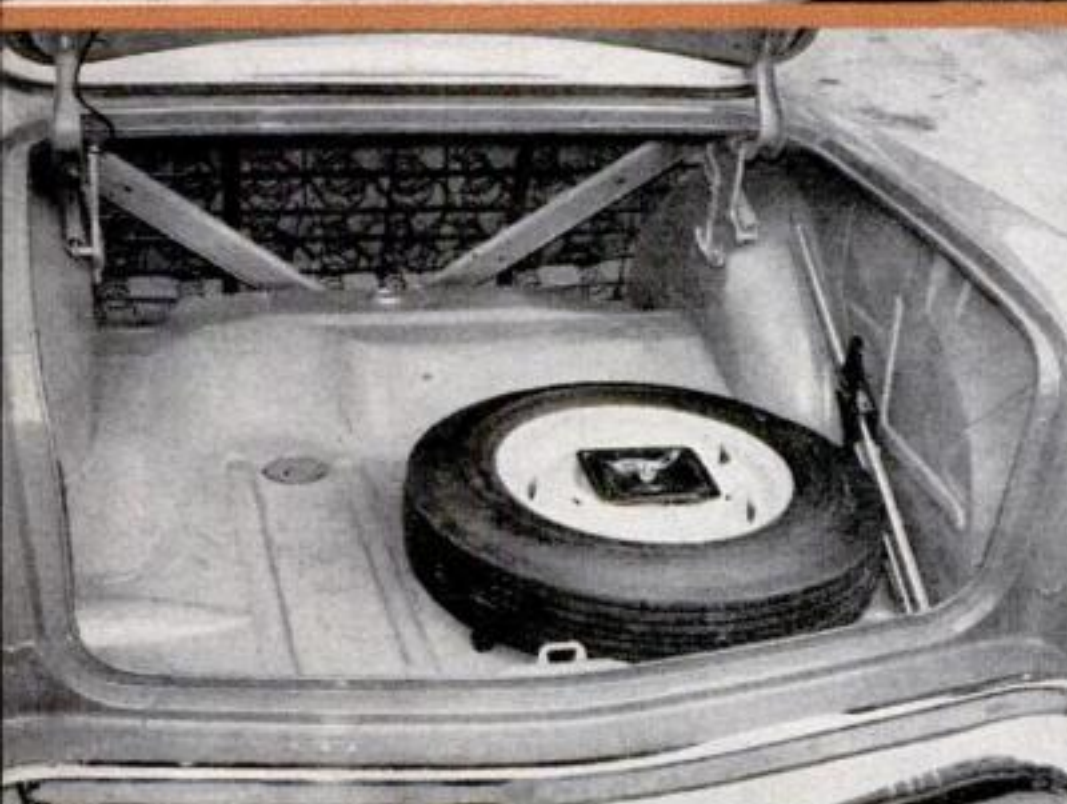
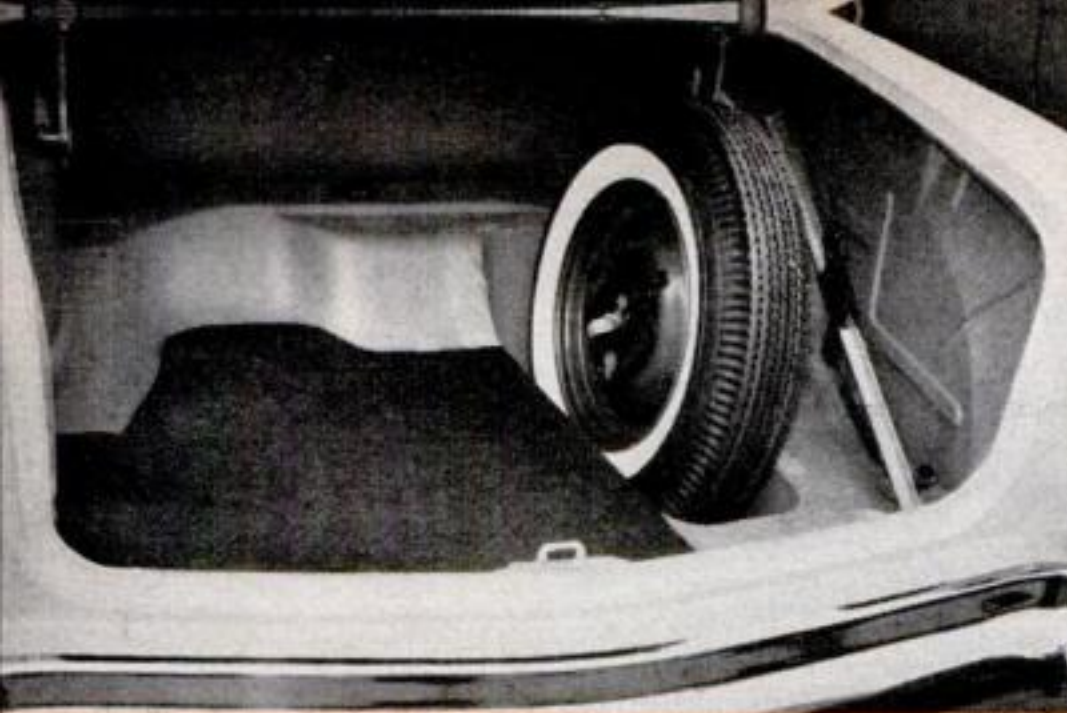
ifications that Studebaker effected on the Champion sedans—and even more on the wagons—to build its low-cost Scotsman, the smallest amount of money saved on an item was a tenth of a cent, on a metal screw. The biggest was about two dollars, on a hood ornament that was replaced with an equally frivolous trinket costing two bits.

The austere Scotsman was not intended to be a high-performance automobile. With four people aboard, it requires 24 seconds to accelerate from 10 to 50 miles an hour—seven seconds more than it takes a regular Champion with the same horsepower.

The difference here between the Champion and its undecorated fledgling is axle ratio. To boost gas mileage, the Scotsman's engine turns at 3.54:1 as against 4:1 for the Champion. Both Scotsman and Champion have a 3.54 axle with overdrive.

Fitted with overdrive, the Scotsman





same amount of luggage), and engine air cleaner is without a silencer. Paint replaces chrome on tail lamps. Two-door sedan has stationary rear

windows. Considered but abandoned by Studebaker: removing vibration damper from engine and insulation from doors and roof.

shades the Champion on fuel economy and does a pretty good job against the little Volkswagen. Again, with four aboard for a total weight of 3,644 pounds, the Scotsman gets 28.6 miles to the gallon at 40 miles an hour; the VW, at 2,272 pounds, gets 37.9. The Scotsman registers 21 miles to the gallon at a steady 60 m.p.h.

Studey's new Scotsman is a gamble. Nothing of its description, or price, has succeeded in wooing the U. S. motorist since before the last world war. Kaiser tried an economy car in the Henry J, Hudson in the Jet. Both are orphans today. (Neither, to be fair about it, had the Scotsman's size.)

Chevrolet, Ford and Plymouth have all flirted with the idea of producing a low-low-priced car. But they contend that the U. S. motorist prefers a gold-toothed second-hand car to an austere new one. They know that the gimmicky cars out-sell "stripped" cars nine or 10 to one.

Chief, perhaps, among the reasons for that is the spread in trade-in value between the two types. Dealers have a bilious eye for cars that don't glitter.

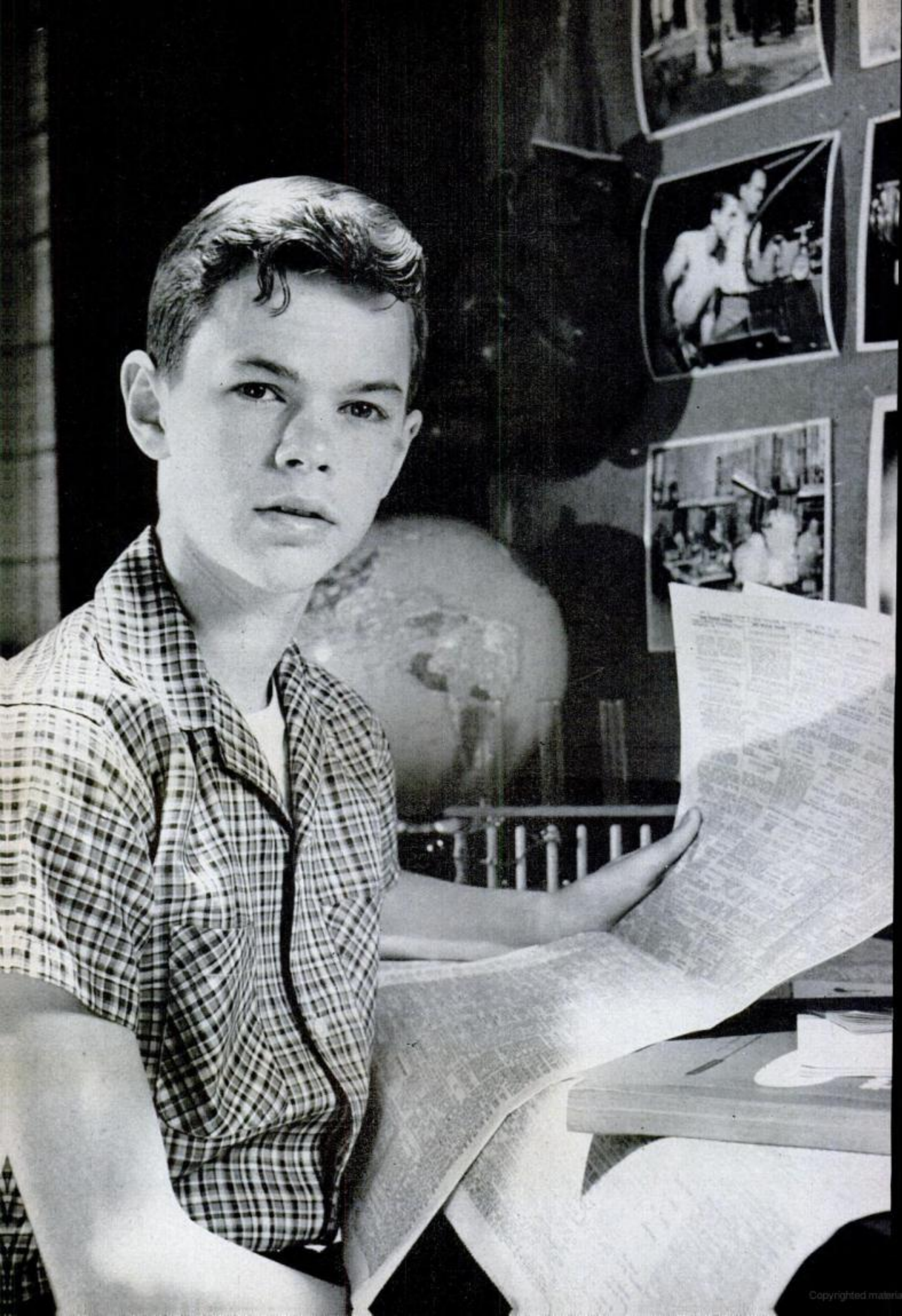
But there's another fact that Studebaker-Packard's president Harold E. Churchill is not overlooking. An economy car will lure a lot of people into his dealers' showrooms to look at his more expensive carriages.

*What dealers will do* with the ADP on the Scotsman—only a "factory-suggested" price—is to be seen. Legally, they can charge any price they want to. In practice, they will tab it for what they can get. Some dealers undoubtedly will sell it below the ADP, skimming off a smaller profit. Some dealers will try to load it with chromed wheel disks, door-handle guards, and Kleenex dispensers.

If the car buyer forks over the fattened figure, he has only himself to blame, because in this case he started off by shopping for economy.

END







# How to Help Your Youngster Choose a Career

**An exclusive interview with the Secretary of Labor reveals many promising careers for tomorrow—and how they fit your children**

**By Martin Mann**

**Y**OUR kids are growing up to greater and more varied opportunities than anyone, anywhere, has ever known before. Today there are more than 22,000 different kinds of jobs in the U.S., many of them so new that they didn't even exist when you started to work. Your son doesn't have to follow your trade. Your daughter can attain a wider life than home and marriage. They can "be" what they want to be.

But they have to choose—not a particular job, but a career, a group covering several possible jobs. And they will need your help, for this choice may set the patterns of their lives from high school to old age. How can you tell which career among thousands is the one?

You can make a wise decision if you're hardheaded about it. Don't let prejudices and folklore swamp you. Search out the facts that answer these three questions:

- What does your youngster *like* to do?
- What is he *fitted* to do?
- Which careers offer the most?

The answers to the first two questions come together, though they may be different and you have to distinguish between them. Here's how to find them:

**Widen his experience.** Show him what your job is like, have your friends tell him about theirs, and take him to visit other offices and shops. Encourage him to try part-time jobs. Urge him to read about careers in books such as *I Find My Vocation*, by Harry Dexter Kitson (\$3.48, McGraw-Hill, New York) and the big

*Occupational Outlook Handbook* (Government Printing Office, Washington 25, D.C. A new edition will be available this fall).

**Observe him.** Let your youngster pull his own weight when he works with you so that you can evaluate what he does. If you can, watch him when he doesn't know you're looking (without spying, of course). And get opinions from other adults—kids act differently away from their parents.

**Test him.** Most schools run students through two types of psychological tests that help match kids to general fields of work—outdoor, clerical, scientific:

• Preference tests reveal which careers a child will *like*. The questions are simply "Would you rather do this or that?" and there are no right or wrong answers.

• Aptitude tests predict the kind of adult work a child will be able to do best when he grows up.

Report-card grades furnish another clue to natural talents, but they don't predict anything (as aptitude tests do); they simply tell how well a child is now doing his schoolwork.

If your youngster's school does not use preference and aptitude tests, an outside agency can give them (check the Directory of Vocational Testing Agencies, published by American Personnel and Guidance Association, 1534 O St. N.W., Washington 5, D.C., for an approved list).

**Your youngster's profile.** You now have the facts about your child—test results, school grades, observations by you and teachers. Write them down. This list



is a "work profile," an outline of the things your child likes to do and can do.

You now have to fit this profile to particular careers. This isn't hard, because books about careers contain equivalent lists itemizing job requirements. One of the biggest compilations is *Estimates of Worker Trait Requirements* (\$2.25, Government Printing Office).

You'll find that your youngster could probably fit several different careers. Most youngsters can. So you'll have a choice, which should be influenced by

very practical considerations: how good the jobs will be, where (geographically) the best opportunities exist, and your own ability to help your youngster get his start.

### ***Which are the good jobs—for 1967?***

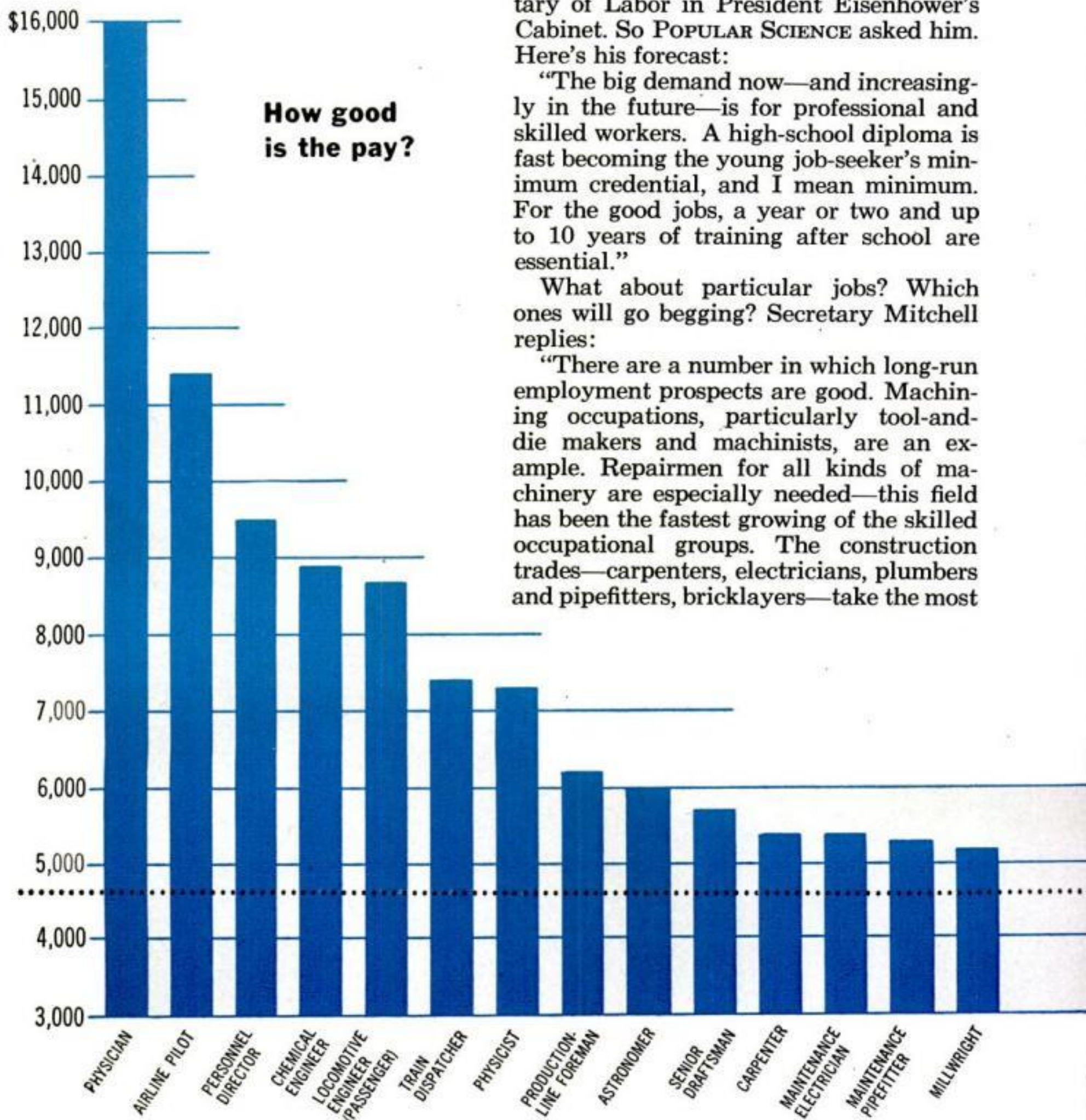
Even the happiest work wears badly if you can't afford to take the family on a summer vacation. Opportunity for advancement, steady and secure income, and the *size* of the paycheck are vital.

There is one man in the U.S. especially qualified to spot the promising careers of the future: James P. Mitchell, Secretary of Labor in President Eisenhower's Cabinet. So POPULAR SCIENCE asked him. Here's his forecast:

"The big demand now—and increasingly in the future—is for professional and skilled workers. A high-school diploma is fast becoming the young job-seeker's minimum credential, and I mean minimum. For the good jobs, a year or two and up to 10 years of training after school are essential."

What about particular jobs? Which ones will go begging? Secretary Mitchell replies:

"There are a number in which long-run employment prospects are good. Machining occupations, particularly tool-and-die makers and machinists, are an example. Repairmen for all kinds of machinery are especially needed—this field has been the fastest growing of the skilled occupational groups. The construction trades—carpenters, electricians, plumbers and pipefitters, bricklayers—take the most





skilled workers. Girls—with training—are in demand as stenographers, typists and business-machine operators.

"Engineers and scientists, in nearly all fields, will find plenty of jobs waiting. So will young people trained for business and governmental administration, teaching, nursing and accounting."

Which industries will have the most jobs? Aren't some expanding while others decline? Secretary Mitchell says:

"The fastest-growing industries in the past few years have been construction, state and local government, finance, insurance and real estate. The future looks very promising, too, for manufacturing—particularly chemical, electronics and metal-working firms, aircraft manufacturers, instrument and machinery makers."

How about the careers that are not expanding? Which jobs and industries are standing still or even dying off? Secretary Mitchell replies:

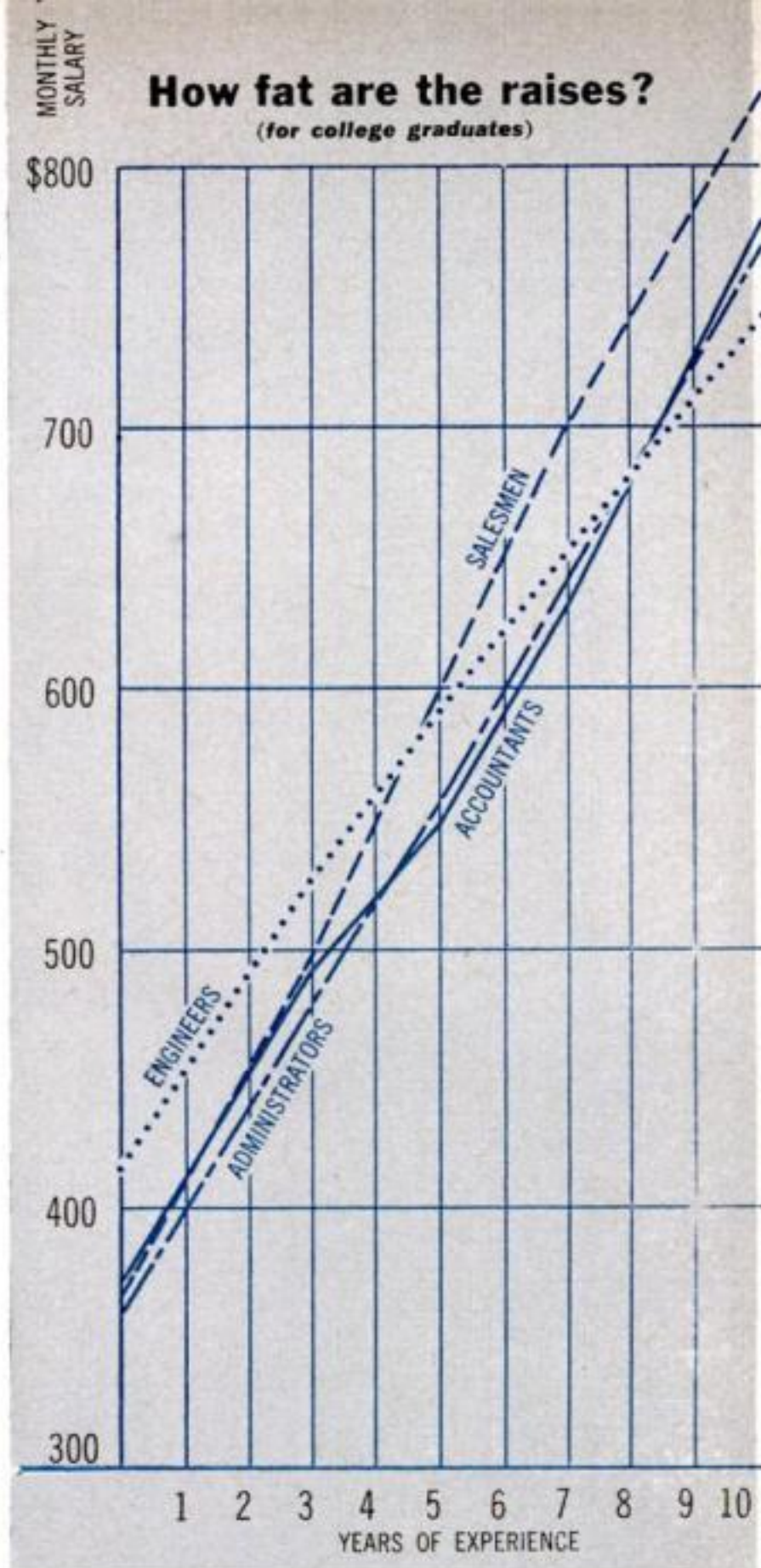
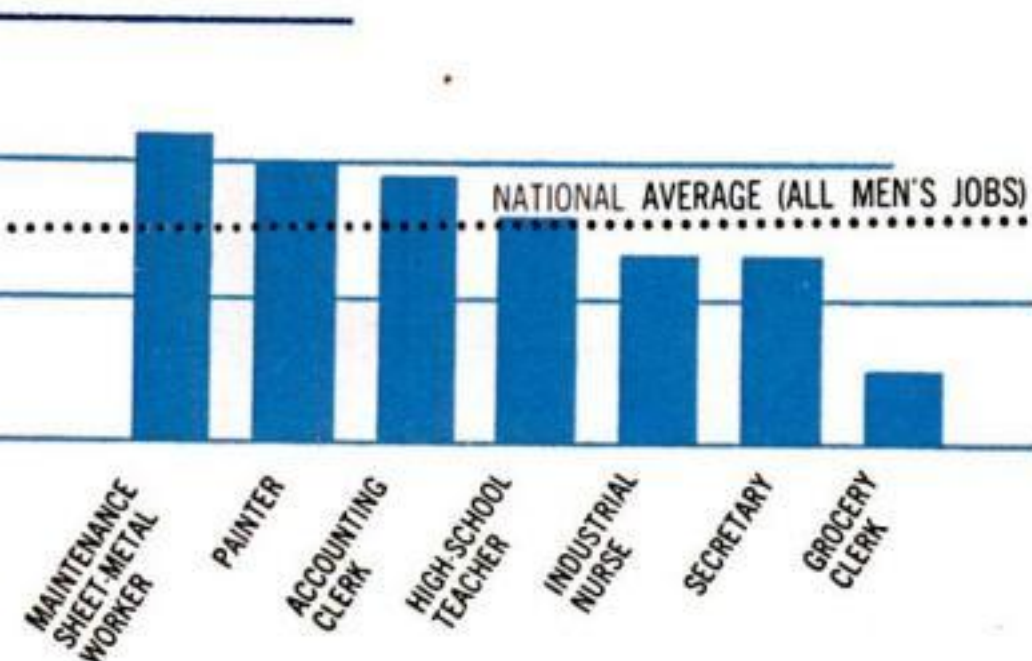
"Unskilled jobs, of course. They're diminishing steadily."

"Among industries, lumber, textiles and leather have been going downhill. Railroad transportation seems to be standing still, although highway and air transportation are growing fast."

Secretary Mitchell owns no crystal ball. What he says is extracted from volumes of statistics that show the way the nation's jobs are going. Here's how the figures stack up.

**Construction workers.** This field, biggest source of skilled jobs, has expanded

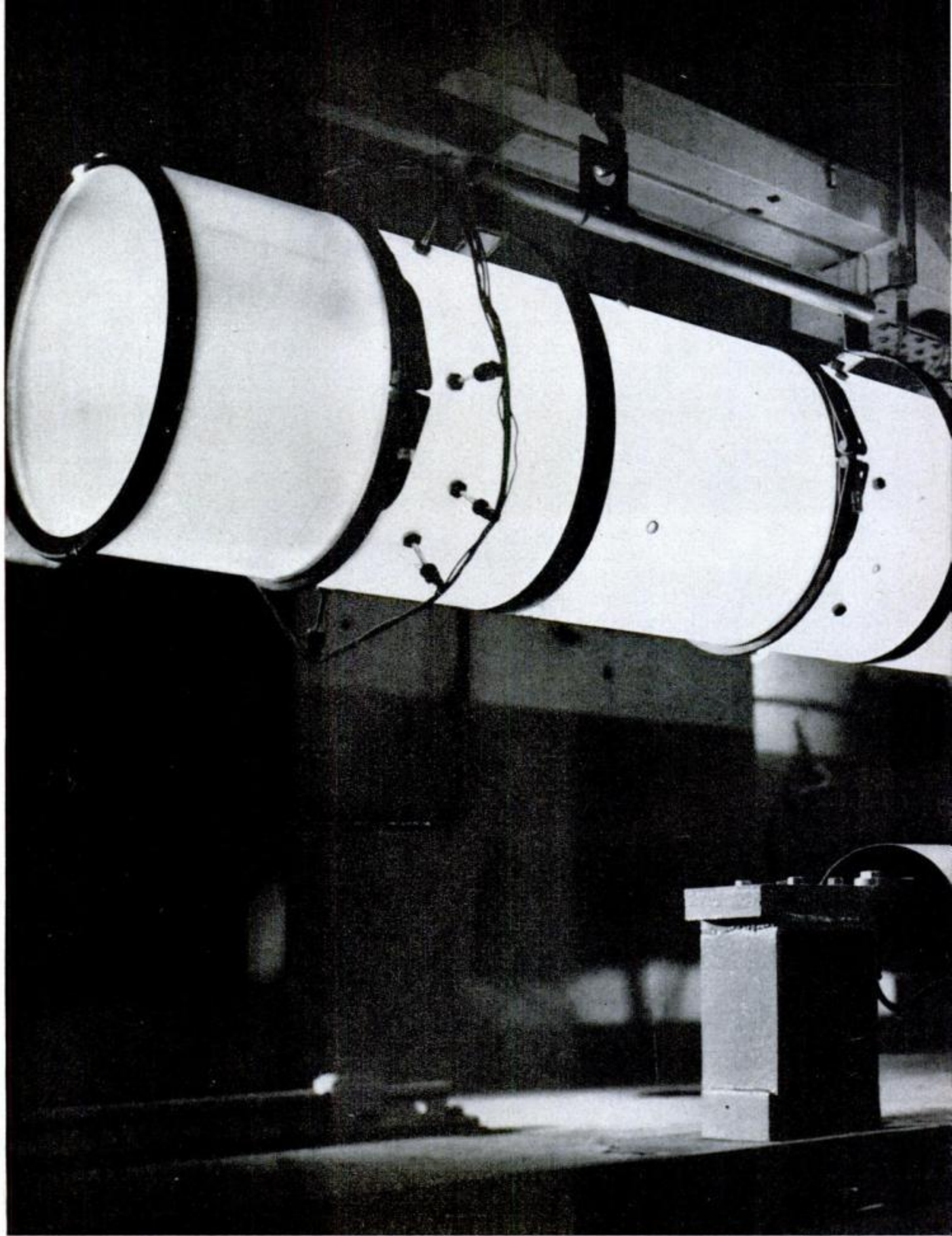
[Continued on page 210]



**IT'S NOT THE STARTING SALARY**, but what your youngster will make when his family is growing up that counts. These figures, from a study of 200 big firms by Frank S. Endicott of Northwestern University, indicate why engineers get discouraged: They start high but are soon passed by men in other professions.

**SKILLS PAY OFF** with incomes above national average for all men (dotted line across chart). Medicine is lucrative (one out of five doctors makes more than \$25,000) but a very tough profession to break into. Flying jobs are scarce (11,000 pilots in all U.S. airlines). In any career, extra training pays extra (chemical engineers with Ph.D.s and 15 years' experience average \$12,000, and one out of 10 in that group makes more than \$20,000). The location of the job makes a big difference for skilled craftsmen. In big and busy cities, not only are hourly wages higher (New York carpenters get 18 percent above the national average), but there is year-round work and plenty of overtime. The figures shown, compiled by POPULAR SCIENCE from many different sources, are the latest available and represent conditions in 1955 or 1956.





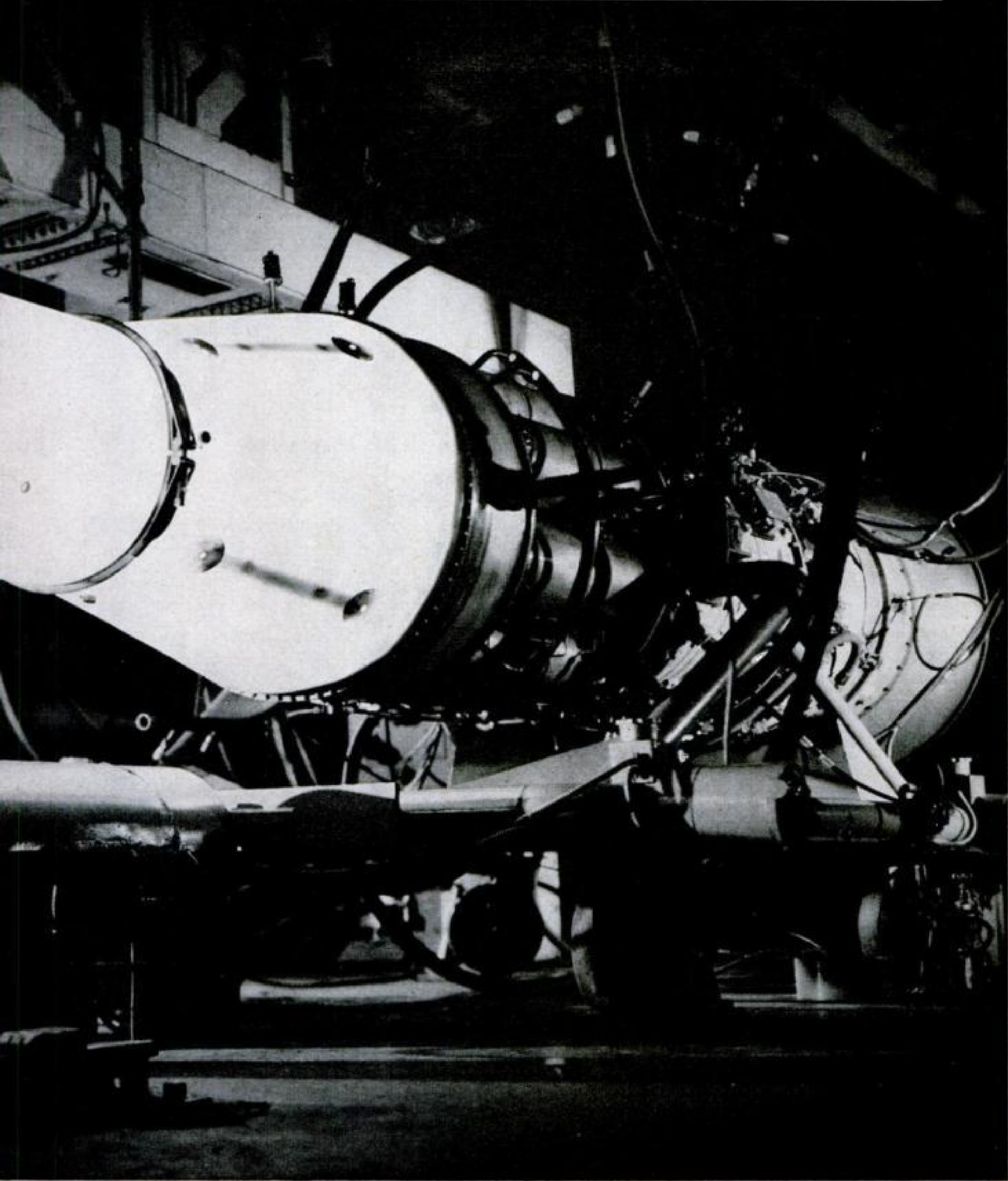
### **White-hot jet helps science beat thermal barrier**

RUN at incandescent temperatures, this jet engine provides flight-condition tryouts of materials developed for heat-barrier operation of future supersonic-plane engines. In GE's Cincinnati flight-propulsion labs, it has been souped up to turbine-inlet temperatures of over 1,600 degrees for



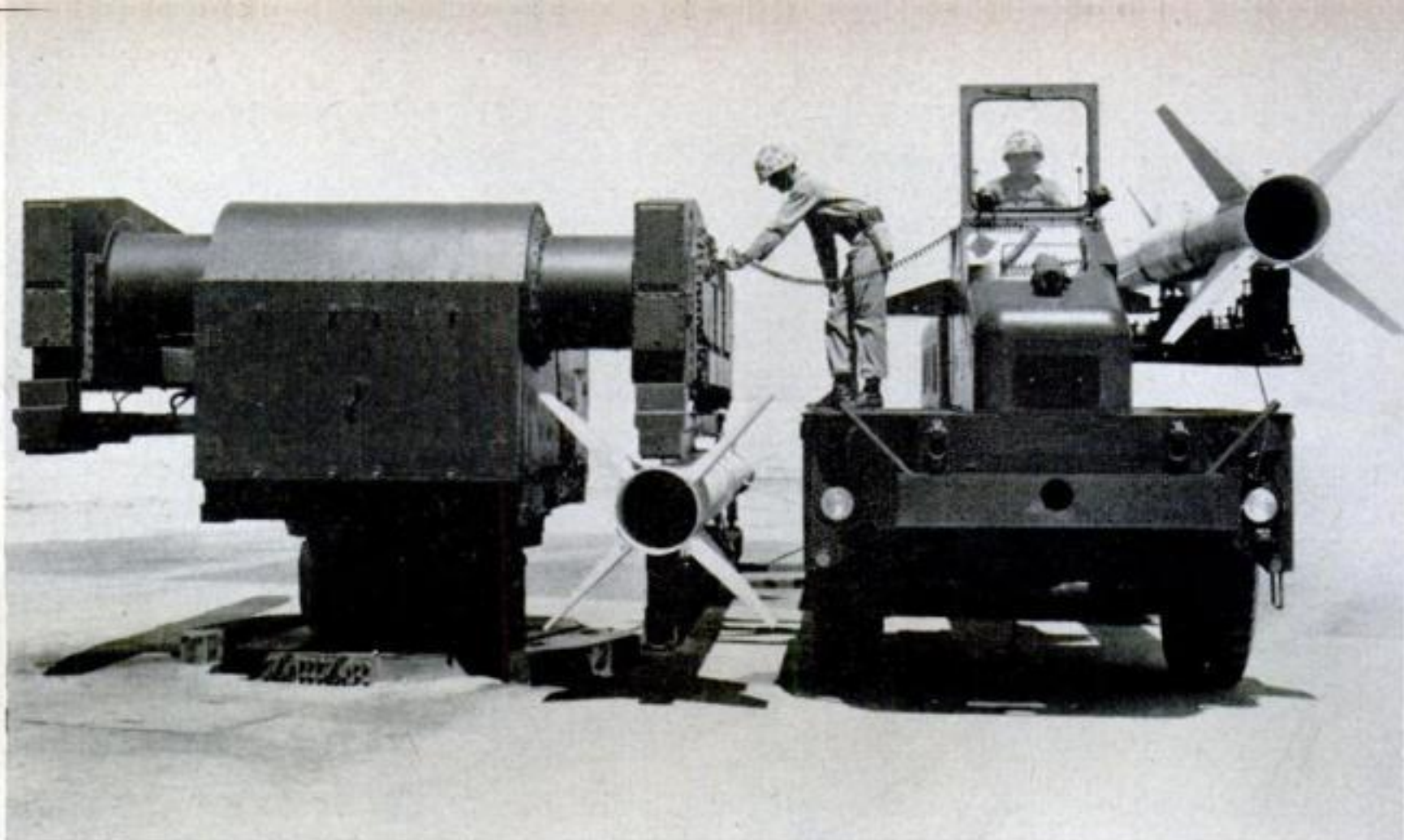
# Picture News

IN THE WORLD OF SCIENCE



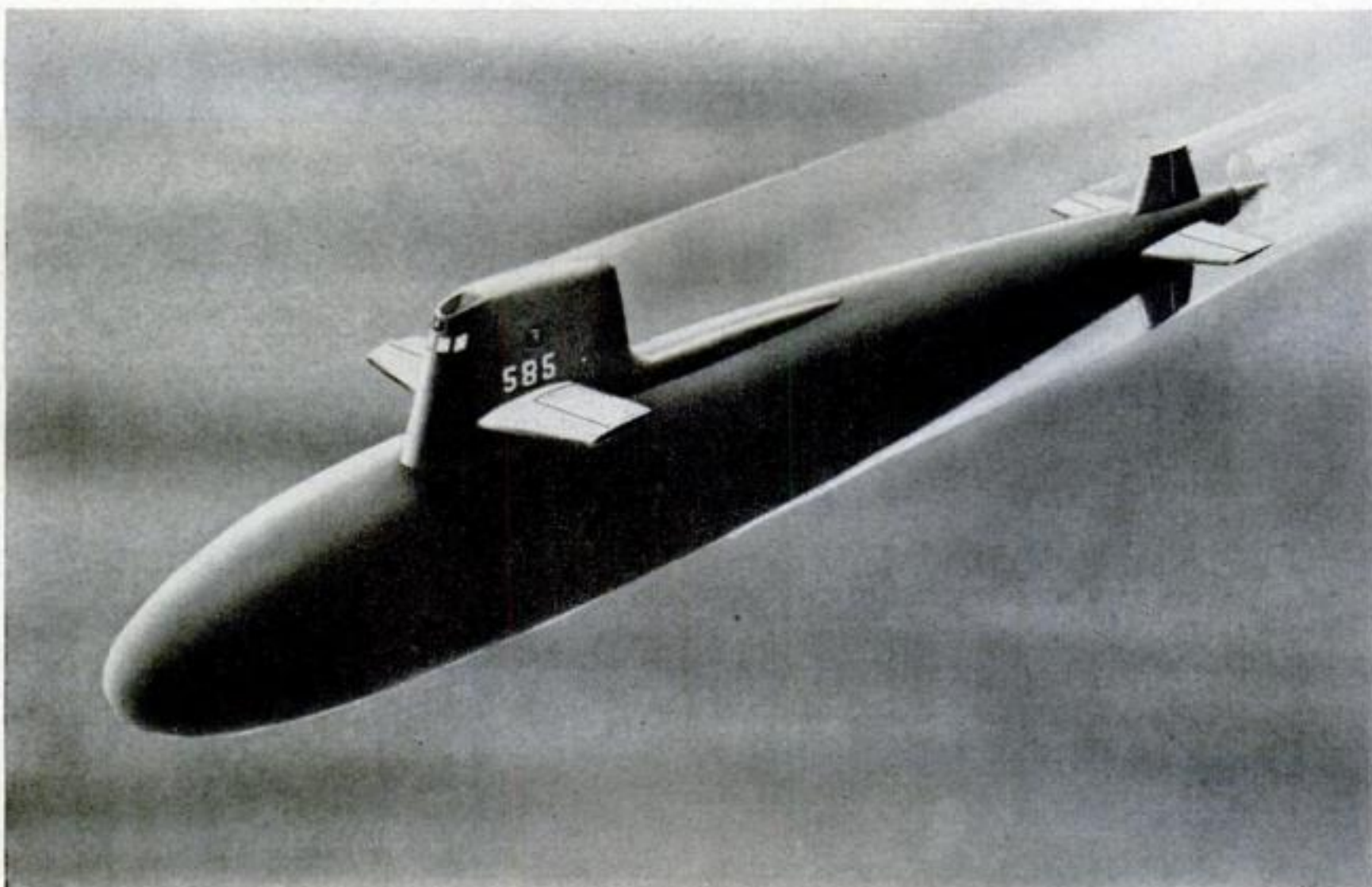
long-run testing of turbine blades and other parts made of materials such as the new heat-resisting ceramic-metal (cermet) alloys and molybdenum coated to retard oxidation. A modified version of the GE turbojet that powers the B-47 Stratojet, it runs with its hottest parts at temperatures far above those attained by production engines.





### **Marines' missile launcher will give 'em both barrels**

THE Marines' supersonic Terrier is loaded in pairs on the new launcher at left, which is serviced by its own dual-carrier truck. With a control system pointing the launcher continuously at an enemy plane, a missile is sent on its way at the exact moment for the most effective hit.



### **Newest atomic sub sprouts wings on conning tower**

Bow diving planes on the SS Skipjack, now being built, will be mounted like wings on the conning tower, for maneuverability and quieter movement. With its blimp-shaped hull and "joystick" controls, the Skipjack is the first U. S. sub designed from the keel up for continuous underwater running. Six of this type are on order.

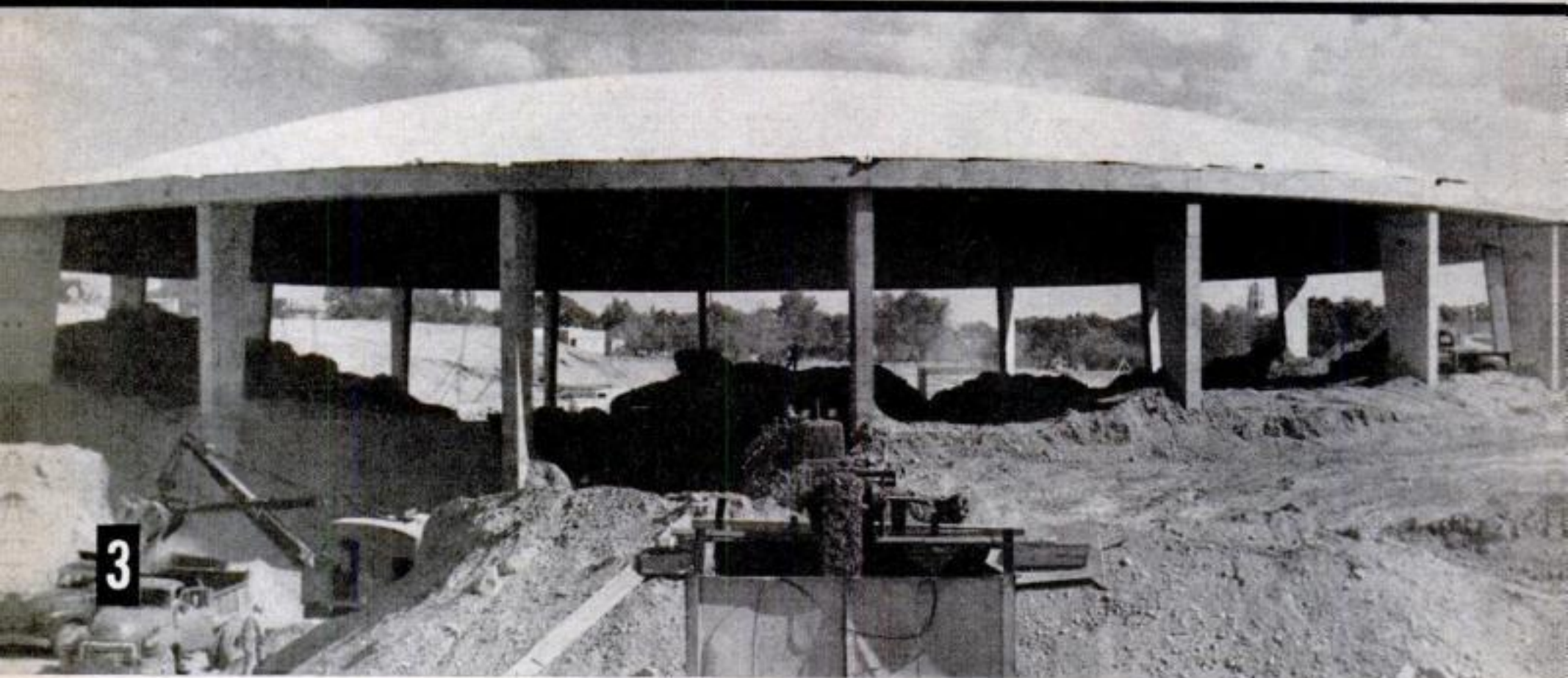




### **Mechanical claw scoops up dirt close to foundation**

THIS side-mounted backhoe takes the backache out of digging against walls and foundations. Its hydraulically operated arm can be used from the right, left or middle of a frame attached to the loader, thereby covering a 200-degree arc. Digging next to a foundation was a pick-and-shovel job before this machine by Mid-Western Industries, Wichita, Kan.



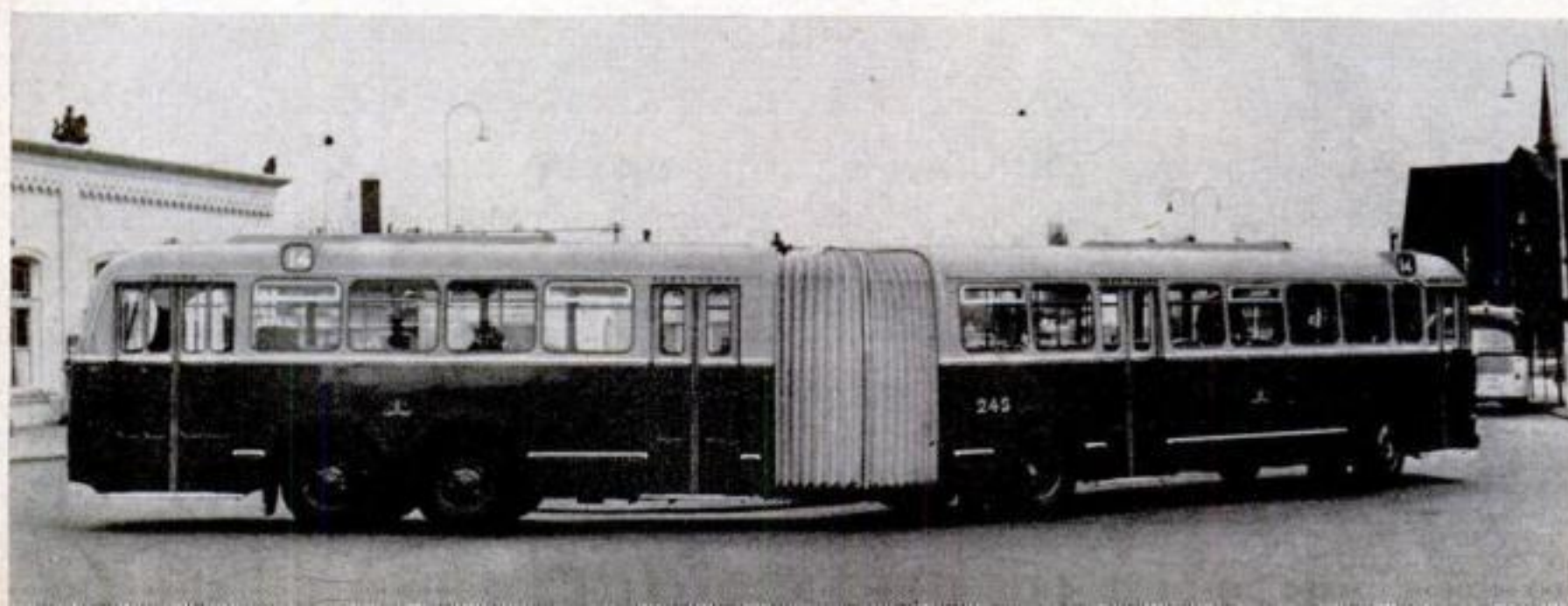


### **6,500-seat auditorium is built from the roof down**

REVERSING the usual procedure, builders poured the concrete roof first and then excavated for a 6,500-seat arena to construct this Civic Auditorium at Albuquerque, N.M. The topsy-turvy method saved \$50,000 on the job. Taking advantage of a hill on the site, the contractors sank

### **Hinged bus turns corners with greatest of ease**

A BELLOWS coupling at the center of this 150-passenger trailer-bus helps it to negotiate corners in downtown Amsterdam, the Netherlands. It keeps out drafts and reduces wind resistance of the 55-foot-long double body. The rear wheels track automatically behind those in front.







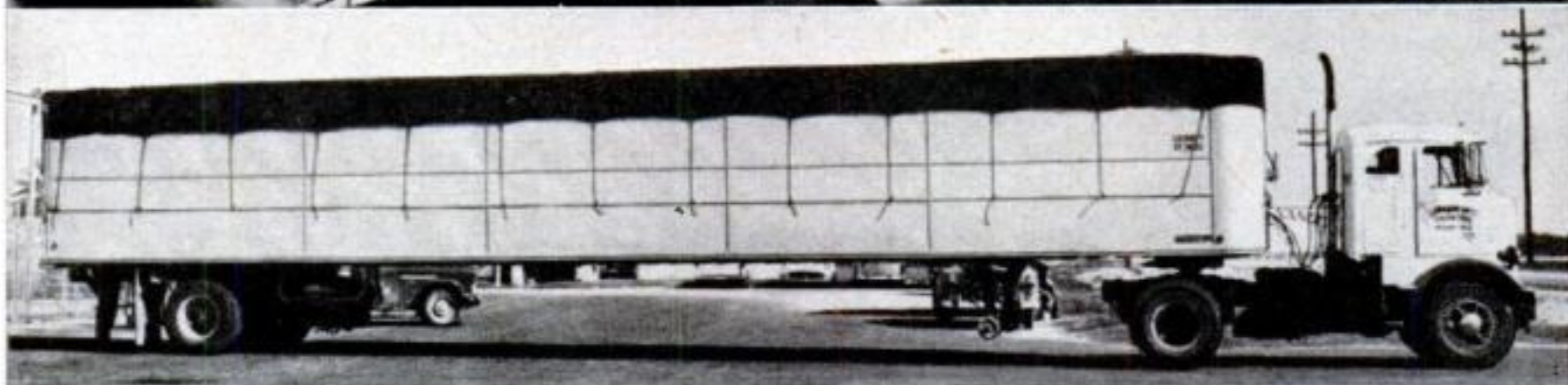
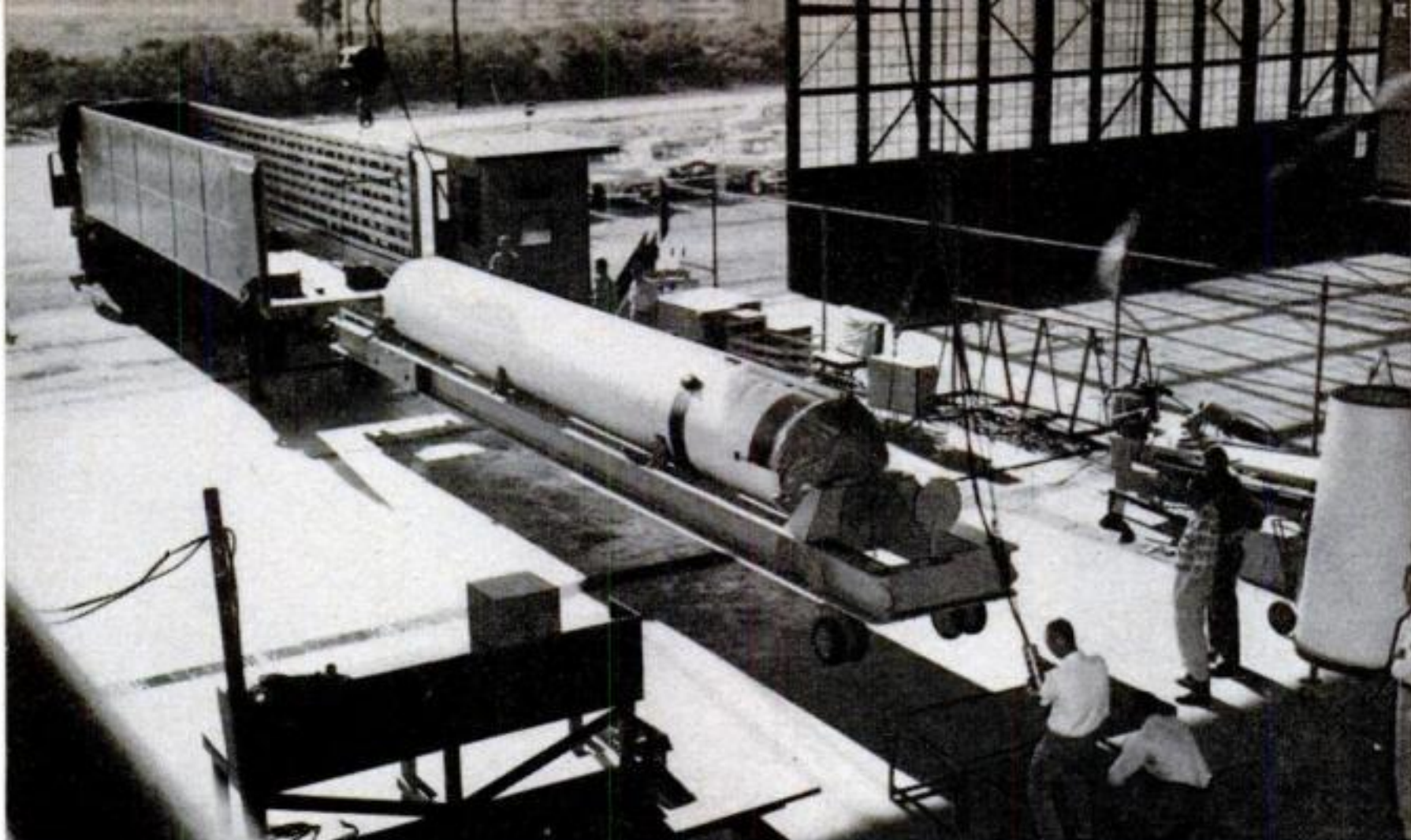
22 footings and reinforced-concrete columns around the perimeter and graded the hill (1) to a 512-foot-diameter dome. Then they laid on a 145-ton steel reinforcing network (2) and poured the concrete shell. Excavation of the mound by bulldozers, shovels and trucks (3) cleared the structure for exterior brick walls (4) and completion of the project.

### Old-fashioned reminder helps flyers land at Navy field

HERE is a piece of down-to-earth equipment that the base commander has added to modern electronic landing devices at the Navy's Moffett Field in California. It's an ordinary electric sign that is flashed on as a final warning to make sure incoming pilots lower their landing wheels.







### Huge trailer hauls test rocket to earth-satellite base

MINUS nose and tail fins, a Viking 14 "stovepipe" rocket is unloaded (top) from a big trailer truck at Patrick Air Force Base, Fla., where it was used as the first stage of a two-stage flight test of satellite equipment. An extra-size trailer more than 40 feet long was required to transport the rocket mounted on its roll-out loading frame.



### Drive-in keeps patrons cool

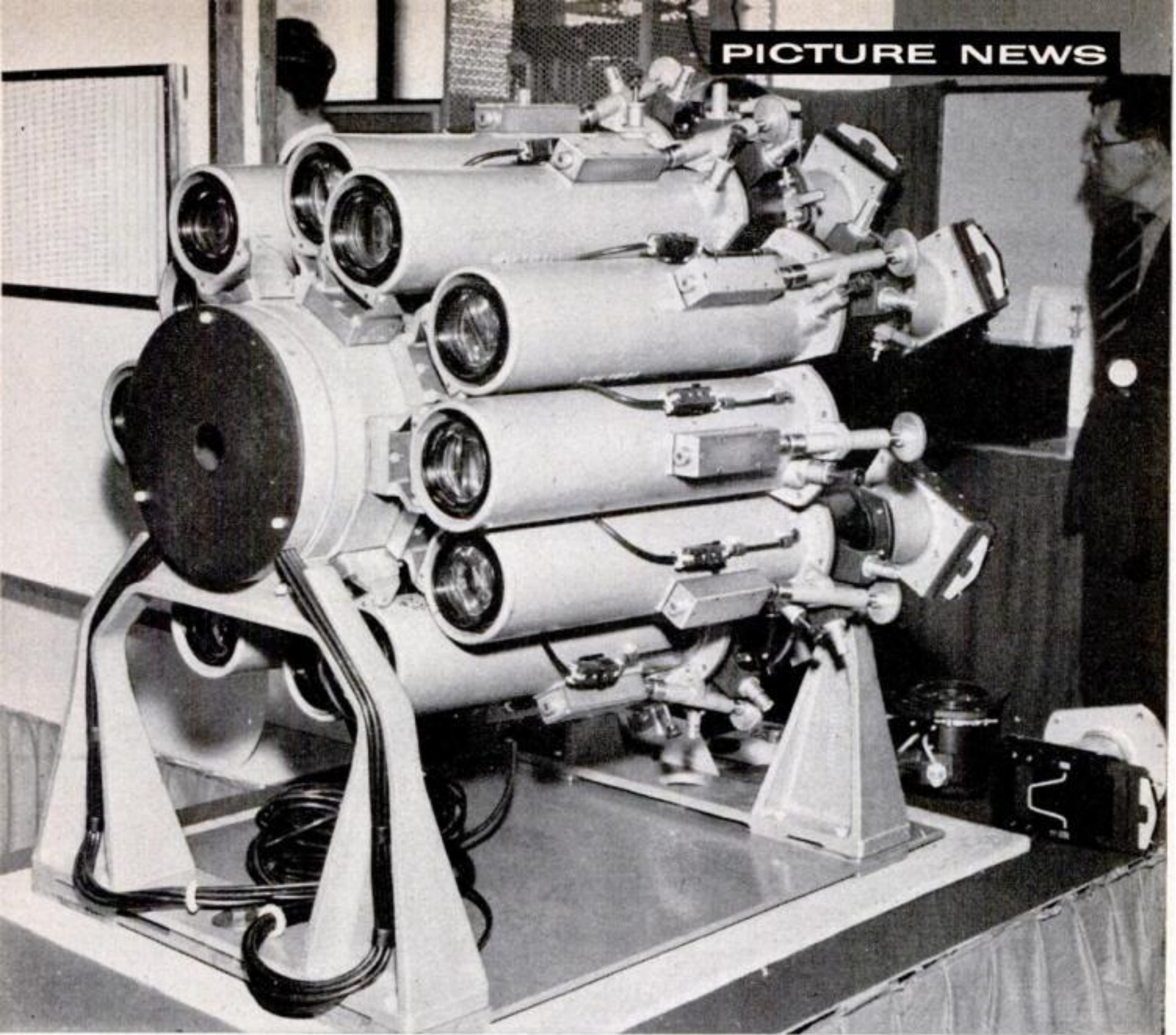
INDIVIDUAL car air conditioners are provided with the hamburgers at this Las Vegas, Nev., drive-in. As the carhop hands you the menu, she attaches a flexible-tube cool-air outlet inside the window.



### Built-in hoist unloads blocks

A NEW hydraulic lift, built into the bed of this truck, has C bars on its arm to go in the holes in a bottom layer of a cement-block stack five deep, six wide and six high. It works by remote control.





### **Multi-lens camera takes sequence shots of blast**

THIS high-speed camera was developed by British scientists to help in nuclear research. Each of its 12 lenses is capable of an exposure as short as  $1/10,000,000$  of a second, and the time between shots is adjustable from  $1/1,000$  to  $1/1,000,000$ . The camera can "stop" a particle flying in an atomic explosion at 20 times the speed of sound.

### **Giant roof overhang will keep plane passengers dry**

AMONG new facilities to be built at New York's Idlewild Airport is Pan American World Airways' cantilever-roofed terminal, to be completed next year. Passengers boarding and leaving from second-story ramps will stay dry in rainy weather and avoid long walks to and from planes.







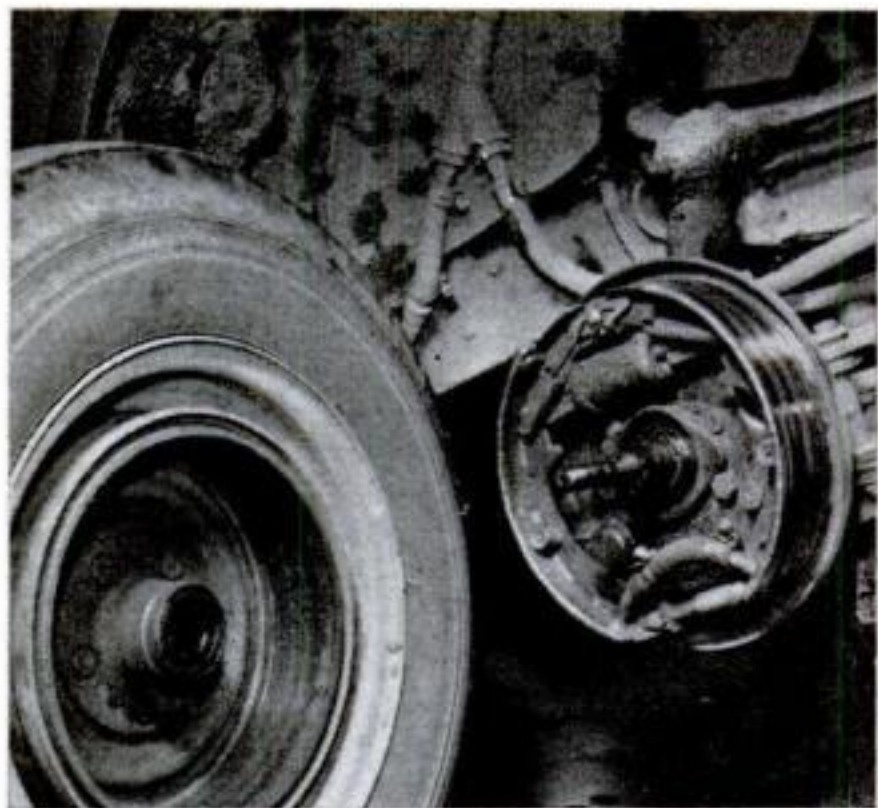
## Army gets globe-girdling radio

PART of the Army's short-wave radio that will beam a message to any spot on earth, a big vacuum tube is lowered here into its drawer-like compartment. The set's power will be 24,000,000 watts.



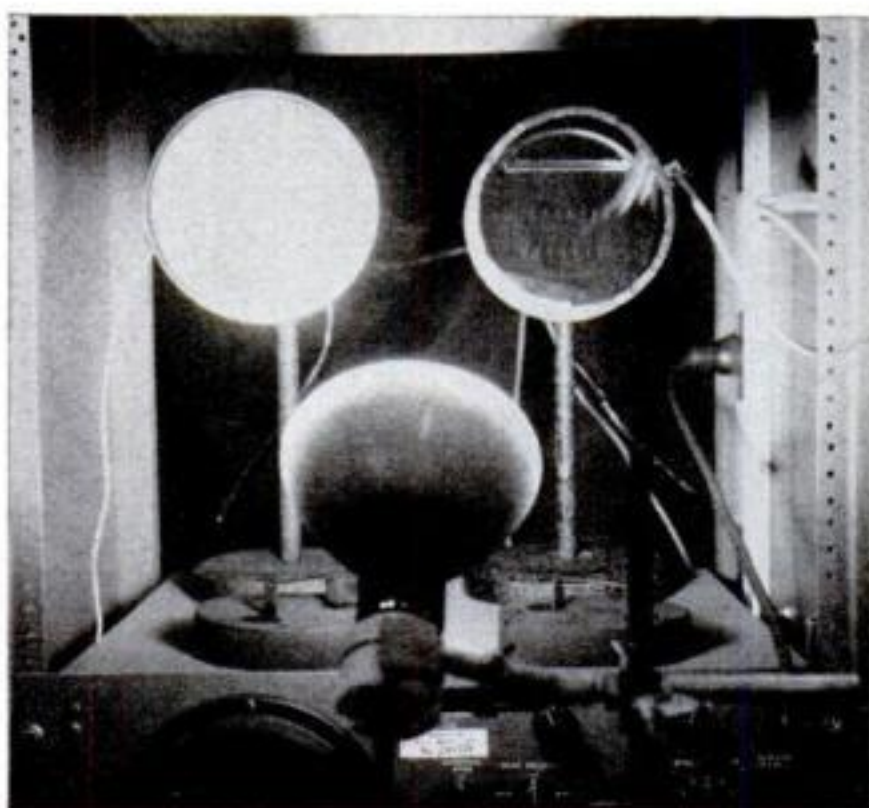
## GIs to use lightweight rifle

THE 8.7-pound M-14 (above left) will supersede the Army's pound-heavier Garand (right), carbine and submachine gun. Its rate of fire: 700 rounds a minute. A bipod model replaces the automatic rifle.



## New brake is liquid-cooled

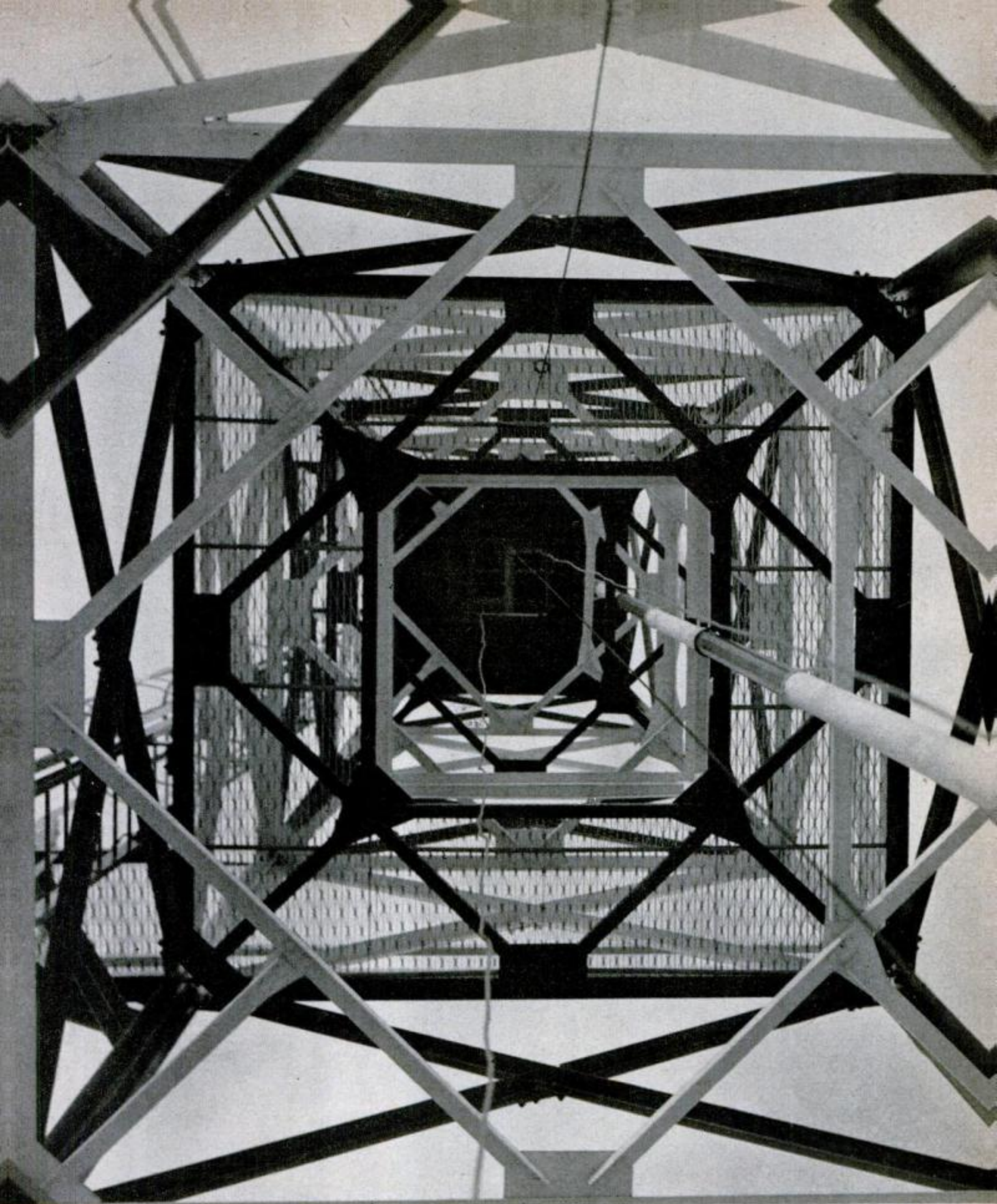
WATER circulated by tubes from the engine cooling system flows in channels in a copper lining fused to the shoe, to cool this new Raybestos brake. The brake lining is in the drum instead of on the shoe.



## TV gets picture in bright light

UNDER a spotlight beam that washes out an ordinary TV screen, the new screen at right shows a clear pattern. Naval Research developed it by depositing a film of phosphor on the face.





### **Bomb tower tests fuses for safety and ruggedness**

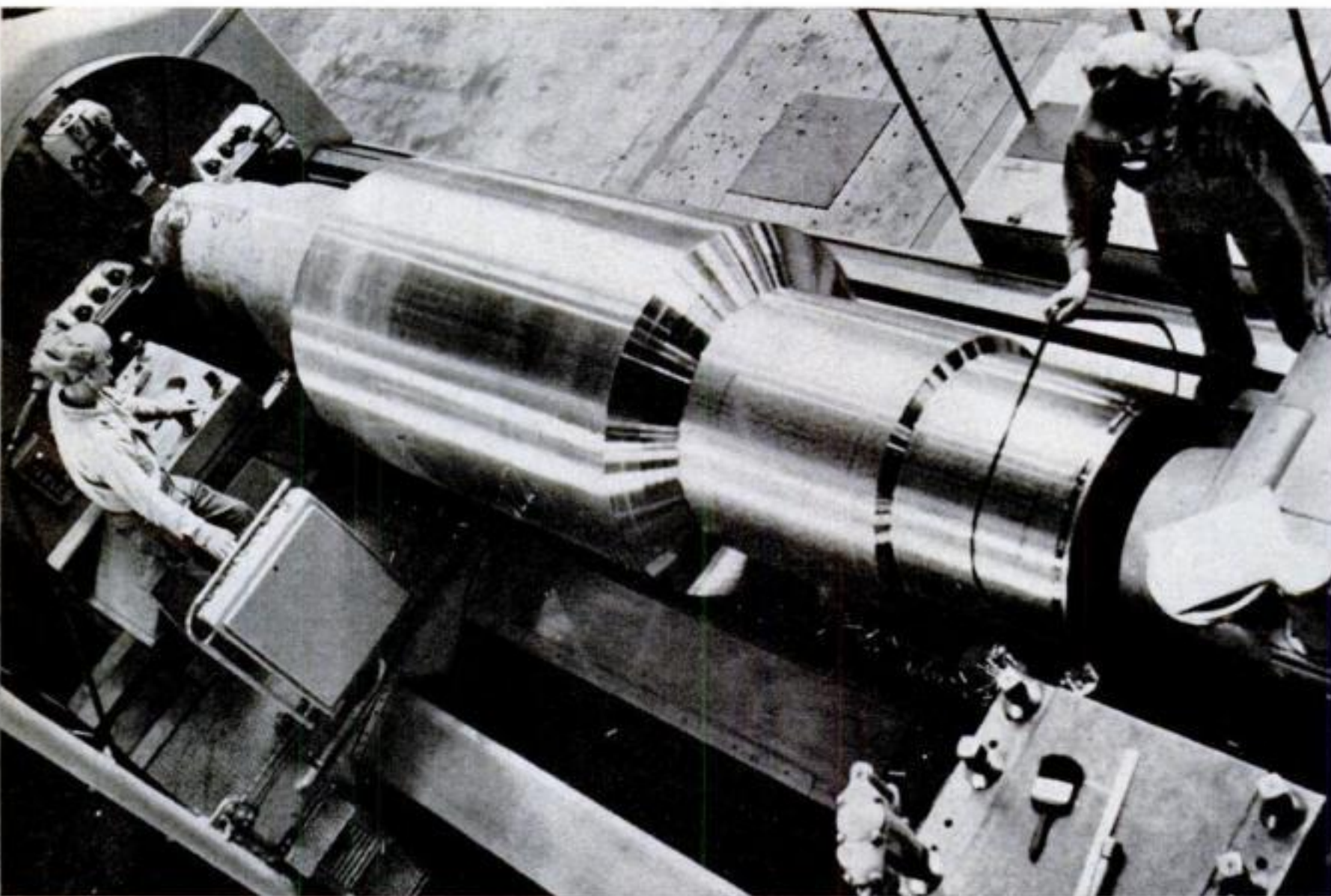
HERE is a worm's-eye view of the 80-foot drop tower used by the Air Research and Development Command at Eglin AFB in Florida to test fuses. A live fuse in a dummy bomb, projectile or warhead is dropped five times, in different positions, onto a steel plate. To pass, it must not be damaged or be exploded except according to specifications.





## Russian excavator dumps waste as it digs and travels

A CZAR-SIZE machine working for Soviet Russia digs canals at the rate of 1,600 cubic yards an hour and pours soil continuously out of the way along the bank. The scraper above, being pulled by two tractors, has a



## Cutting tools take huge bite to speed job in big lathe

USING special Carboloy carbide tools in dual toolposts (right foreground), this 30-foot lathe reduces a 57-ton steel-mill roller by 12 tons in 16 hours. It used to take 68 hours. The tools, made by General Electric metallurgists, cut thick three-inch-wide chips, 24 times the size of those from older tools. They are heated to 250 degrees before each start. The lathe, German built, is in the Ohio Steel Foundry at Lima.





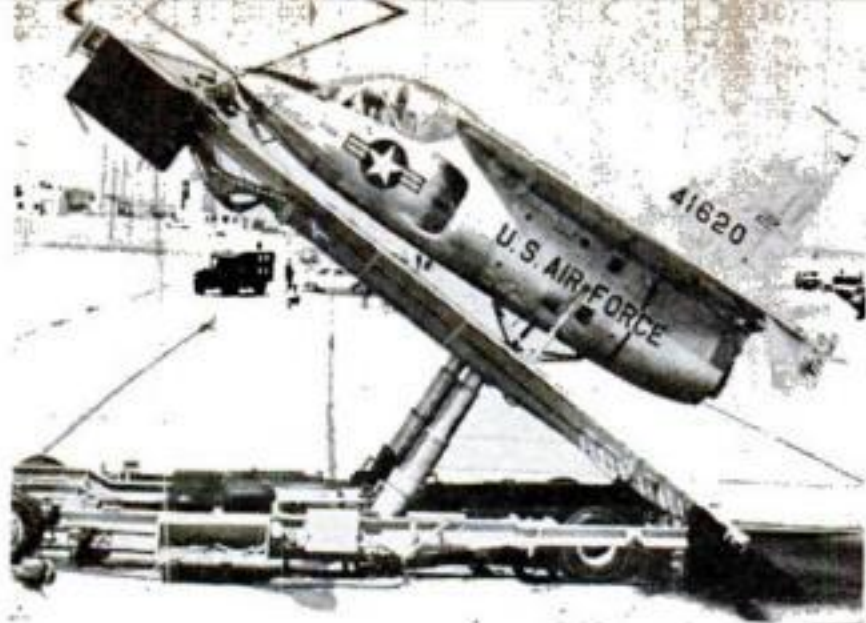
10-foot blade and a 40-foot conveyor driven by a built-in diesel. It tows one end of another conveyor that bridges the excavation, while a third tractor draws the far end. The scraper drops with the bed on successive cuts. It is reversed by swinging the tractors around.



### **Off-street practice range trains high-school drivers**

THIS 200-by-500-foot auto-driving range contains an intersection with traffic lights, stop streets, a backing lane, a slight hill, and spaces for parking practice. Thirteen student drivers can use it at the same time. Mumford High School in Detroit built the range when Michigan passed a law—first in the country—requiring youngsters under 18 to complete a driver-education course in order to get a license.





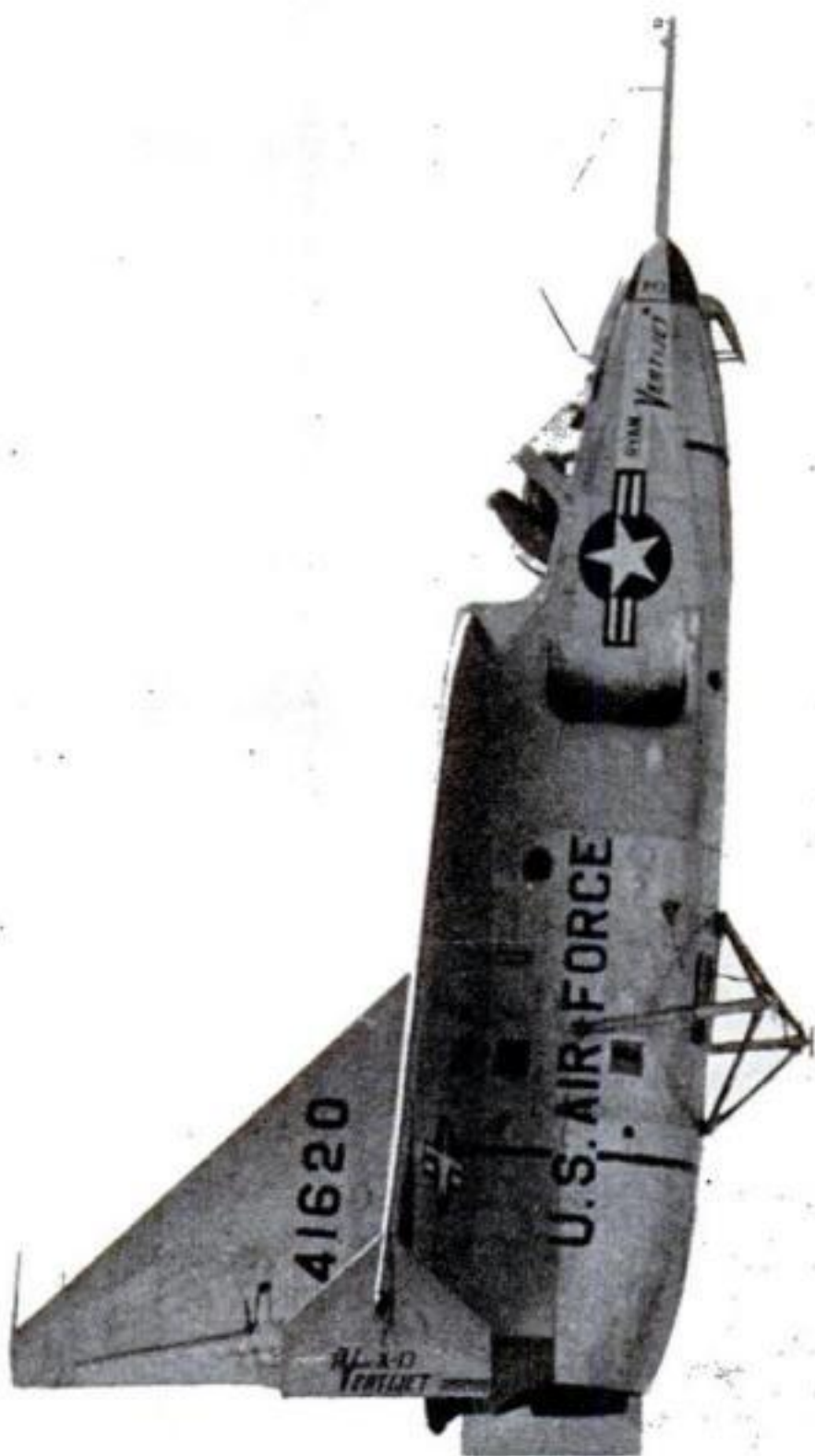
Up goes the Vertijet on mobile launcher . . .



. . . to position, ready for blasting off . . .

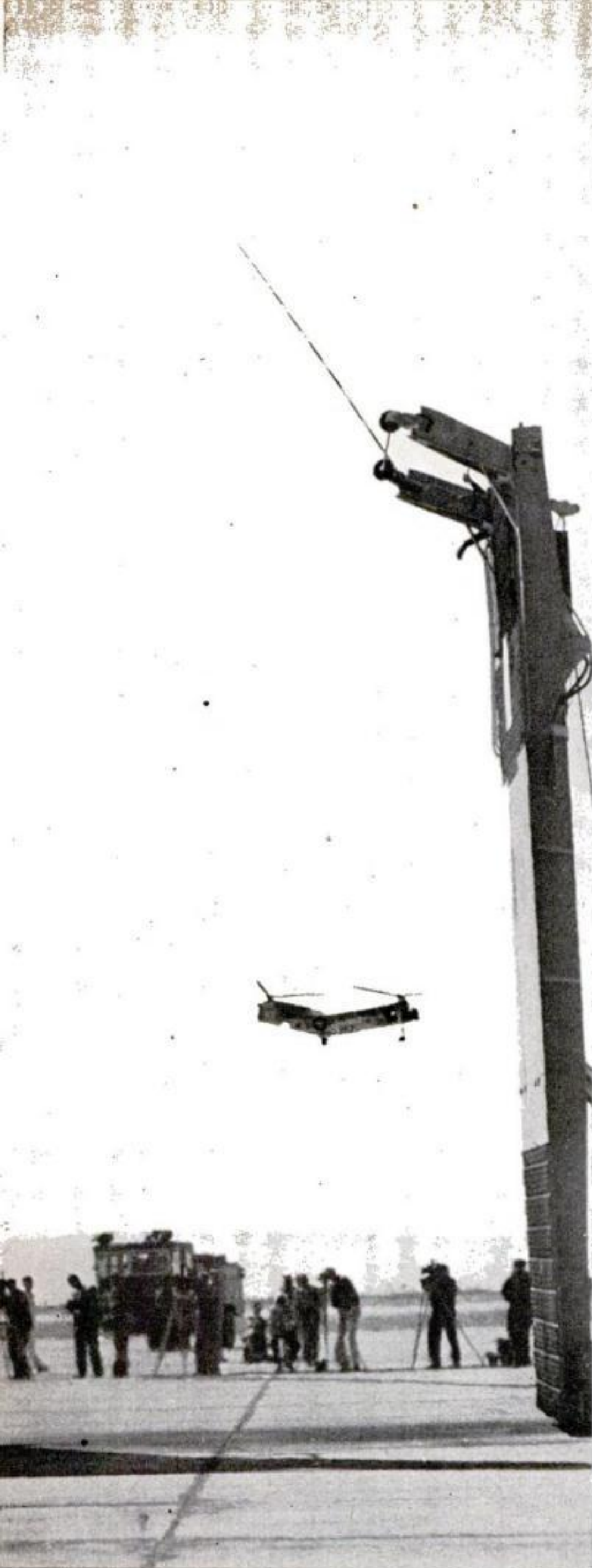


. . . into the air and arching to level flight.



Test flight completed, X-13 Vertijet hovers





for landing, supported on invisible jet stream.



Safely hooked at home, pilot gets an okay.

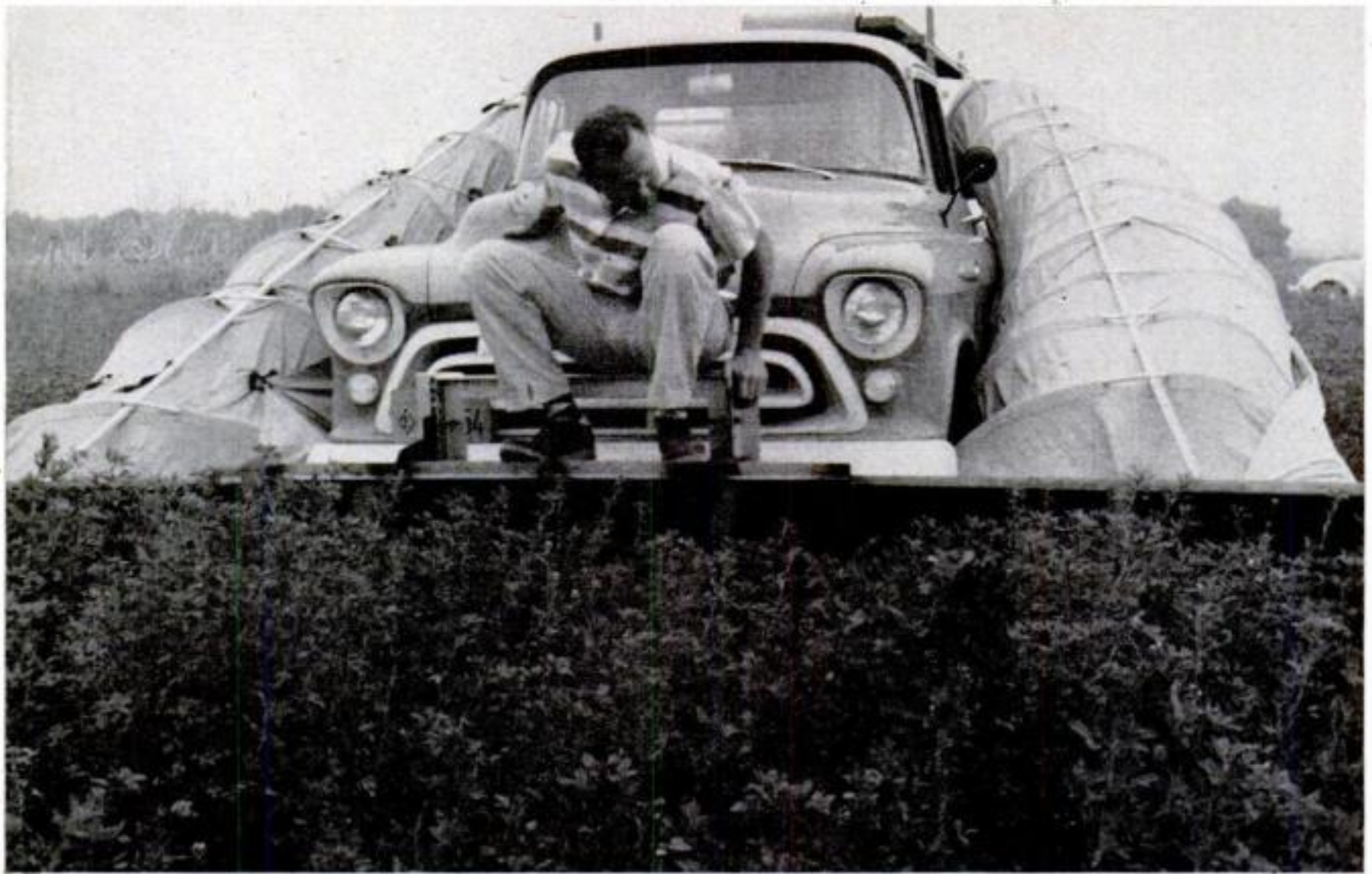
### Vertijet takes off straight up from launcher like a rocket

Now they have a *jet* that takes off vertically into the air. It arches into level flight like a diver from a springboard. It comes in tail down, lands with only a nose hook to snag the launcher.

The Air Force's new Ryan X-13 Vertijet is the first VTOL (vertical takeoff and landing) plane able to take off without propellers to "screw" it into the air like helicopter rotors. Instead, it rides on its jet stream, which is also the source of control while hovering.

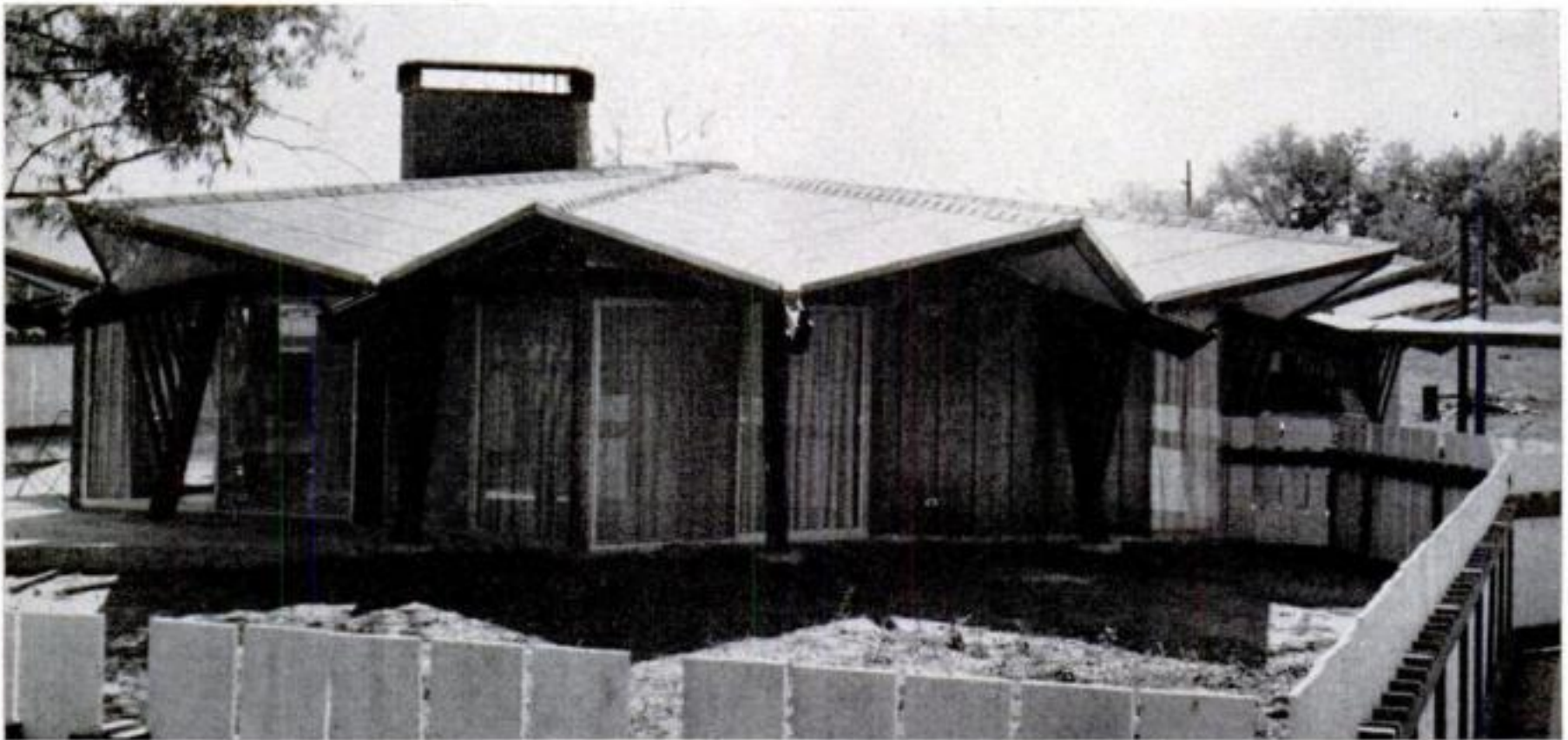
The launcher is a wheeled trailer with a bed on which the plane is hauled horizontally to the launching site and lifted hydraulically to takeoff position.





## **Vacuum 'drafts' insect recruits to fight alfalfa pests**

THIS giant hay-field vacuum, built by University of California scientists, can scoop up 50,000,000 parasite wasps in half an hour as it rolls along. The wasps are carried to areas infested with alfalfa aphids, and spread over fields to war on the crop destroyers.



## **Star-shaped roof gives house clear span of 42 feet**

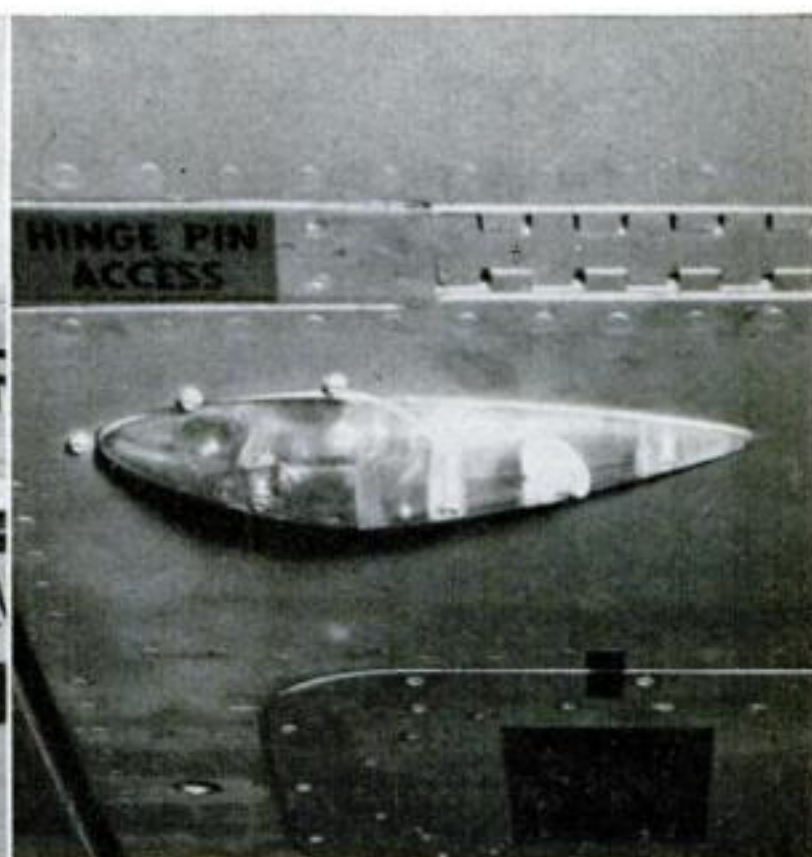
DESIGNED with a strut-supported roof in the shape of a 12-point star, this New Orleans home uses less lumber than a conventional house of its size. It is light and strong and has a clear span of 42 feet as compared with the usual 16. Architect Albert C. Ledner built it for himself.





### **Pet-size anesthetizer readies dog for operation**

THE cone anesthetizer being snugged over the nose of this dog makes it easier to prepare any small animal for an operation. Fingertip controls enable the veterinarian to vary the mixture, while flow adjusts automatically to lung volume. The instrument is also a resuscitator.



### **'Jetallite' flies to help moonwatchers track satellite**

THE first satellite (simulated) to take the air, this Air Force Sabrejet flew over Washington recently in a training program for moonwatchers who will keep track of the real earth satellite. It carried various-size lights (right) under the fuselage to simulate altitudes up to 1,500 miles.





### Push-button machine sorts letters in mail speed-up

FIVE men at the keyboards here sort 15,000 letters an hour to 300 destinations. By hand they could distribute 7,500 to only 75 points in the same time. Letters appear in the windows in front of the operators, who punch the keys to chute them to the boxes below. The machine is one of several being tried out by the Post Office.



### Porsche-Diesel tractor powered by air-cooled engine

THIS new tractor is made by the German Porsche-Diesel works in one-, two-, three- and four-cylinder models. It has a differential lock for working in soft ground and a crawl gear that permits a speed of under a half-mile an hour. All sizes will be imported into this country.





# How Doctors Now Use Hypnotism Safely

*In the strange trance of hypnosis, pain and fear may be  
miraculously dispelled—but you should know its dangers*

**By John Kord Lagemann**

**I**N NEW YORK recently a meeting of anesthesiologists watched a breast-removal operation in St. Vincent's Hospital. Instead of receiving gas or drugs, the patient was hypnotized. After the

operation, the patient sat up, drank a glass of water, reported no pain or nausea, and walked back to her room. In Dallas, Tex., a polio victim under hypnosis was delivered painlessly of a normal baby, and then returned to her iron lung.

After centuries of scorn and neglect,

JULY 1957 97



## ▶▶▶ Answers to common

*Once I go into a trance, will I have any trouble coming out?*

If you're a fairly normal person it isn't likely. But it does happen once in a while with an emotionally disturbed subject. Like an infant tyrannizing its mother, he may use his utter dependency to manipulate the hypnotist by making demands and refusing to come out of the trance until they are granted.

Dr. Griffith W. Williams of Rutgers University tells of a psychologist who put a subject under hypnosis and produced the hallucination that he was looking at a movie he had previously seen. When the psychologist attempted to end the trance, the patient told him irritably to stop talking. "If you want to walk out, go right ahead but I'm going to sit through to the end and then see it over again."

*Is susceptibility to hypnotism a sign of low intelligence?*

No. It is hard to hypnotize an idiot because he can't follow verbal directions. Otherwise intelligence has little to do with it. Children are the easiest subjects because they are least critical and most imaginative.

*Can I be hypnotized without my knowledge?*

Yes. At demonstrations of hypnotism some audience members often go into a trance unaware of what is happening. Putting a subject in a trance without his knowledge is not difficult for an experienced operator.

*Can I be hypnotized against my will?*

Very probably. Reputable psychologists report many experiments in which highly resistant subjects were hypnotized against their will—even when they were handed money and told they could keep it if they resisted. If you don't want to be hypnotized, don't fool around with it.

*Does repeated hypnosis weaken the will?*

The oftener you are hypnotized, the less resistance you have to it. But if you use hypnosis to evade your problems instead of tackling them, it's a sign your will was probably weak to begin with.

hypnotism is becoming respectable. Reputable medical and dental authorities have found that, when properly used, it is a valuable tool for diagnosis, treatment and research. The more they learn about it, however, the more they fear its misuse, not only by amateurs and quacks, but by overenthusiastic doctors and dentists.

"Unprofessional use of hypnosis can result in serious emotional disorder, intense physical distress, and sometimes even mental illness," says Dr. Milton V. Kline of Long Island University's Institute of Research. "Some subjects of stage and

amateur hypnotists have remained in alternating states of hypnosis for many months following the hypnotic experience."

Since 1952, when the British Parliament banned hypnosis for entertainment purposes, the United States, Canada and Australia have been the only major countries that place no restraints on its practice. Because so many doctors are using it, the American Medical Association has appointed a committee to study the problem of legislation. Meanwhile, most doctors feel that the best way to protect the



# questions about hypnotism

*Can I be made to commit a dangerous or immoral act while in a trance or under post-hypnotic suggestion?*

Most leading authorities on hypnosis agree that this can be done and offer proof in experimental situations and actual fact. Using hypnosis, psychologists have persuaded normal intelligent subjects to reach for poisonous snakes, throw acid at the experimenters who were protected by invisible screens, testify falsely under oath, reveal secrets and turn against friends because of purely imaginary grievances suggested by the operator.

*How can a normal person be induced to perform antisocial acts?*

Hypnotists say he can be regressed to childhood when he had fewer scruples and less control. He can be made to identify himself with a criminal personality or a historic figure who lived according to different standards. He might be told that the act in question is not antisocial at all but necessary and desirable.

A Danish psychiatrist, Dr. Paul Reiter, recently reported a strange case: A man who confessed to the brutal murder of three persons apparently had no motive for the act. Nothing in his background indicated homicidal or criminal tendencies. In the course of psychiatric examination at the Copenhagen Municipal Hospital he was put in a trance and told the doctors that he had been previously hypnotized by an ex-convict who had directed him to perform the murder. The ex-convict confessed and soon the Danish courts will have the job of deciding on the guilt of one or both of the defendants.

*Well, is hypnotism dangerous to me?*

If you submit to hypnosis *only* by a qualified doctor in whom you have complete confidence, you needn't worry. Your chance of benefiting from hypnosis depends almost entirely on the caliber of the person who performs it. Nobody in his right mind would think of allowing anyone but a qualified medical man to administer narcotic drugs or perform surgery. There is no more justification for submitting yourself to the "mental surgery" of hypnosis by amateurs, entertainers and quacks.

patients from quacks is not legislation but information.

One difficulty with controlling hypnotism is that it is so easy to learn and can be practiced without special paraphernalia. It is a misconception that a person who is able to put you in a trance must have some special "gift."

"Actually the technique of hypnotism is hardly more difficult than the technique of using a hypodermic needle," says Dr. Kline. "But merely knowing how to induce a trance doesn't qualify a person to practice hypnotism any more than handi-

ness with a hypodermic needle entitles him to inject people with drugs."

The purpose of all hypnotic techniques is to focus the subject's attention on a single idea, sensation or image and then feed him other suggestions—that he is becoming more and more deeply relaxed, that his limbs are beginning to feel numb, that he can and wants to experience anything the operator suggests. The average person responds by shutting out perception of the outside world and identifying himself only with the hypnotist's voice.

Just what happens in the brain and



nervous system to produce this strange state is still unknown. But there is no mystery about what happens in your mind. In order not to frighten the patient, some doctors and dentists explain that it is merely "complete relaxation" or "heightened suggestibility." This is misleading. In reality hypnosis, when carried beyond the light trance stage, is an intense, emotionally charged relationship in which the subject becomes in many ways as dependent on the operator as a baby on its mother.

"Hypnosis satisfies a deep, unconscious urge to submit completely to a leader or parent figure," Dr. Benjamin Simon, psychiatrist of the Ring Institute, told a medical audience recently.

"In hypnosis we find the same lack of any distinction between self and the environment that the baby finds in the womb," writes Dr. Margaretta K. Bowers of the American Psychiatric Association. "There is a feeling of complete union with someone who encompasses us with love." Freud, who used hypnotism early in his career, compared the subject's feeling to that of "someone in love to an unlimited degree" and noted "the same humble subjection, the same compliances, the same absence of criticism."

**T**HIS surrender of responsibility may explain the deep pleasure most people find in the trance state. Feelings of submissiveness are sometimes accompanied by sexual fantasies, particularly in women. One doctor told me of several colleagues who had treated women under hypnosis and been confronted by angry husbands, one of them carrying a loaded automatic. Their wives had confused hypnotic fantasies with reality. And in the hypnotist, the feeling of dominance over the patient may also yield pleasurable sensations.

"Under no circumstances," warns a 1955 report of the British Medical Association, "should female patients be hypnotized except in the presence of a relative or a person of their own sex."

In hypnosis you descend into realms of the mind beneath the level of normal awareness. Like a skin diver watching his pressure gauge, you learn to recognize three stages of trance—light, medium and deep.

1. Light trance. In this stage, which

almost anyone can enter, you feel relief at being able to unload your cares on the doctor. You pay rapt and uncritical attention to his words. The muscles of your eyelids become slightly rigid and you either close your eyes or stare without blinking. Your pain threshold is raised and you are able to relax during procedures you would ordinarily find threatening. Doctors often induce a light trance just by speaking in a soothing, reassuring manner.

2. Medium trance. Here you may still keep your eyes open and talk. But your voice has a faraway sound and your movements are slow. At first you may feel that you can follow the doctor's suggestions or not as you like. But presently if he tells you that you cannot blink your eyes or move your arm, you find out he's right.

**A**S YOU go deeper you become almost insensitive to pain and lose control of the larger muscles in the legs, arms and back. Your senses of touch, taste and smell are controlled by the doctor. If he mentions roses you can smell them. If he says the room is hot you sweat. If he says it's cold you shiver. You may begin to hallucinate—or chat with people that aren't there. Or the doctor can make you completely oblivious of people who are present. If, for example, he tells you that the secretary carrying a bowl of flowers across the room does not exist, you may see the bowl moving through the air, but not the secretary.

3. Deep trance. While half a doctor's patients can enter the second stage, only about one out of 10 can enter the deep trance. Here anything can happen. The doctor can raise a blister on your hand by touching you with a pencil and telling you it's a hot poker. At his bidding your heart will beat fast or slow, your blood pressure will rise or fall. You experience keenly any feeling he suggests—rage, elation, pain, pleasure, hunger, thirst or satiety. The doctor can not only make you see people who aren't there—he can change your identity by telling you that you are someone else. A minute may seem like hours, or hours seem like minutes.

At the doctor's suggestion you can "regress" to any stage of your life in-

[Continued on page 200]



# New Ideas from the Inventors

.....



**1 Car Fountain Serves Cool Drinks.** With this spigoted, box-shaped vacuum flask mounted under the dash, you could cut down on roadside stops and still enjoy

cooling drinks whenever you—or passengers—felt thirsty. The box would slide out of its frame for refilling; a hinged bracket would hold paper cups under the spigot.

**2 Lighted Fan Gives Insects the Air.** Flying bugs attracted by the light in this fan would soon find themselves on the outside of your house, looking in. The inventor suggests that insect-attracting scents might be used, in addition to the light, to lure bugs into the draft.

**3 Paddle Gloves Keep You Afloat.** Flat, buoyant sleeves like these might hold you up in the water and, serving as flippers, help your swimming. Intended chiefly for emergency use by lifeguards and small-craft passengers, the gloves could be pulled on faster than a life jacket.

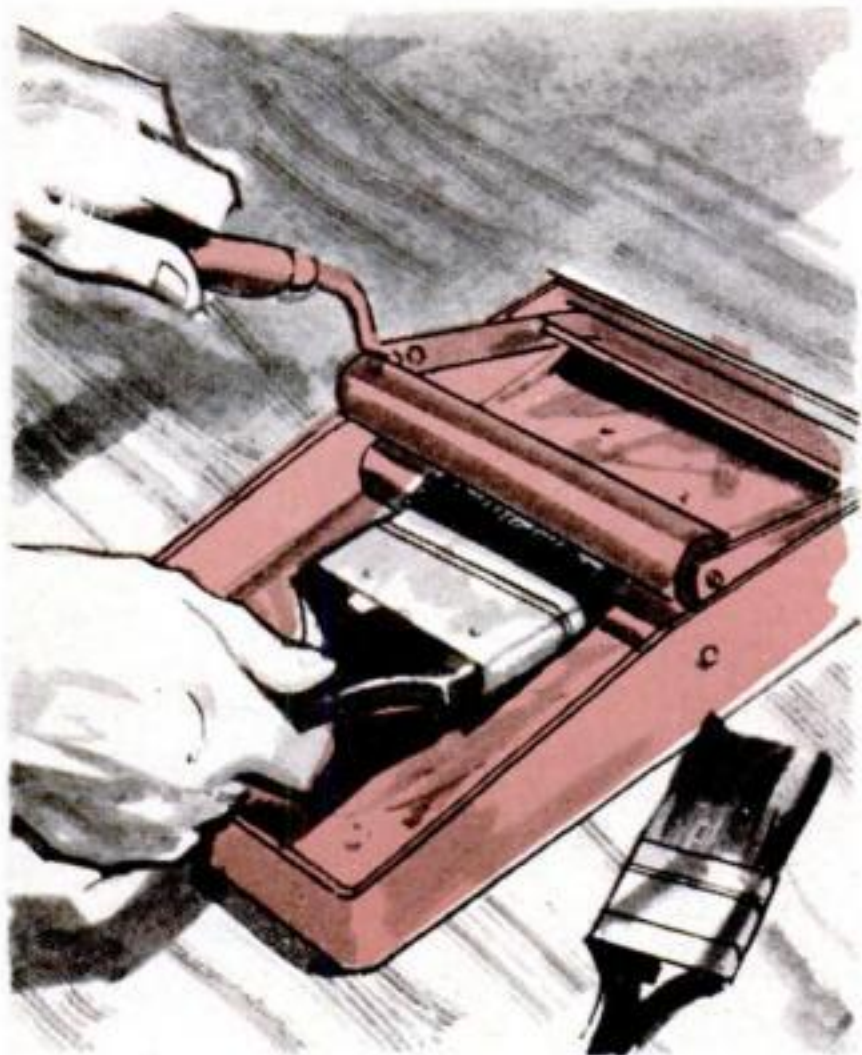


**Please turn the page for more new ideas**

**JULY 1957 101**



## More Inventors' Ideas



### 4 Cleaner Wrings Paint Out of Brush.

Soaking paintbrushes usually wastes a quantity of solvent and rarely gets bristles as clean as you'd like them. This shallow, wringer-type cleaning tray would use solvent sparingly, then squeeze both solvent and old paint out of the brush.



**5 Sponge "Cap" Cools Your Head.** The heat of the sun might help to cool you off if you wore a headband like this. The spongy material would be moistened with water, so that the part of your head in contact with the band would benefit from the cooling effect of evaporation.

**6 Outboard Carries Its Carrier.** Once clamped to your outboard, this pivoted dolly would become a permanent attachment. The wheels could be turned down

to serve as a stand or carriage. Turned up, they'd lie flat against the motor shroud where they wouldn't interfere with operation or reduce steering radius.







### 7 Tilt Signal Proves Rough Handling.

This label would tell you whether a fragile shipment had been well treated in transit. The sender would paste on the device and pull a rip cord; after that, any severe tilt or jolt would cause a marker to show through a window in the label.

**8 Meter Clocks Tape Time.** With this calibrated roller and clock mechanism fastened to the deck of your recorder, you could measure both the time and tape length of a recording. Unlike built-in indexing devices (which count wheel revolutions rather than tape travel), the timer would help you locate recorded parts even after a reel had been edited.

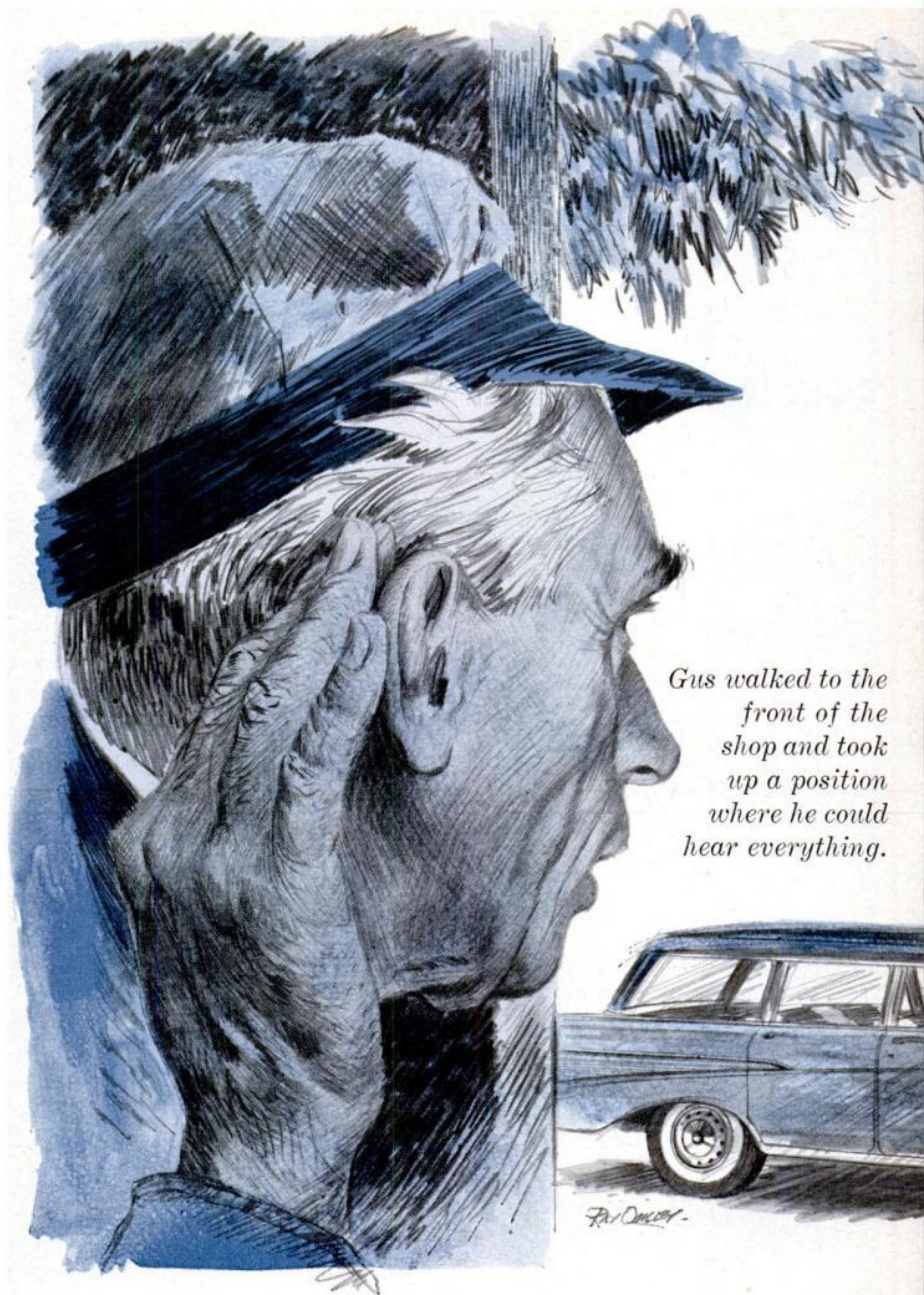


**9 Jig Holds Studs for Nailing.** This carpenter's jig would help you square up meeting two-by-fours, and would then keep them from shifting while you toenailed them in place. After lining up brace members against the right-angled flanges of the jig, you'd give it a tap to drive gripping spurs firmly into the wood.

The following patents have been issued on these inventions: 1. Patent No. 2,708,540 to Betty and Bobby Cook, Talco, Tex.; 2. No. 2,739,411 to John and Harry Chapman, Creve Coeur, Mo.; 3. No. 2,692,995 to Charles Le Bihan, Paris, France; 4. No. 2,724,848 to Louis Horvath, Reading, Pa.; 5. No. 2,769,308 to Louis Krasno, Pensacola, Fla.; 6. No. 2,711,152 to Eugene McGregor, Litchfield, Conn.; 7. No. 2,768,602 to Arthur Eichholz and Henry Samuelson, Polo, Ill.; 8. No. 2,757,456 to Itsuo Handa, Kyoto, Japan; 9. No. 2,718,247 to Benjamin Kalina, Bowman, N. D.

Copies of patents may be ordered, by number, from the Commissioner of Patents, Washington 25, D. C., at 25 cents each. To write to an inventor, if the address given above is insufficient, you may address him (by name and patent number) in care of the Commissioner of Patents.





*Gus walked to the  
front of the  
shop and took  
up a position  
where he could  
hear everything.*

*Ray Omer.*



**The little old man in the station wagon was  
dead sure all garagemen were crooks.  
That was a challenge Gus couldn't resist**

# Gus Bets on a Sure Thing

**By Martin Bunn**

**A** NEW station wagon coughed and sputtered and came to a stop at the curb in front of Gus Wilson's Model Garage.

Gus removed his pipe from between his teeth, knocked ashes into the palm of his hand, and walked out to the street.

"Go away!" shouted the driver. "I didn't stop here because I wanted to."

Gus was taken aback. "What seems to be the trouble?"

"Troubles enough! And now I have to stall in front of your place. It's fate. You're all out to get me!"

"We are?" Gus couldn't suppress a twinkle in his eye. The old gentleman seemed about to pop with indignation. Gus continued: "Something wrong with your engine?"

"You're ding dang well right something is wrong with my engine. It stops for no gol-durned blankety-blank reason. Half-

way up a hill. Right in the middle of traffic. Anywhere. Just stops. And now it has to stop in front of your place."

"Let's have a look at it," Gus said, taking a step toward the hood.

The old gentleman flung open the door and pulled himself up to his full height—not much over five feet. "You keep your hands off my car!" he shouted. "You're just like all the others. You want to get at my engine, tinker with something, talk me into replacing an expensive part, and then send me on to the next crooked mechanic."

Gus looked at the angry motorist. Here was a job, he realized, for a public-relations expert.

"Mister," he said, soothingly, "I won't touch your car until you ask me to. In the meantime, you just park here as long as you want to." He turned on his heel and went into the shop.

The old gentleman watched him go, his eyes suspicious.

**G**US walked to the back of the shop, out of the old fellow's sight, where he found Stan Hicks, his young assistant, dressed and ready to go home. Gus told him about the apoplectic little man out front.

"Send him on his way," Stan said angrily. "If he thinks we're pirates, let him go somewhere else. We don't need him."

"It's not that simple," Gus explained. "He's stalled out there and even if we don't need him, he needs help. Besides, we can't let him go around telling everybody that all garagemen are crooks. This little old guy is a challenge."

"But how are we going to help him if he doesn't want help?"

"Look," Gus said, "he doesn't know you. Go out the back way, stroll around to the front as if you were just passing by, and





get him talking. I'll listen in. Maybe I can tell what's wrong."

Gus walked to the front of the shop and took up a position out of sight, where he could hear everything.

"Hello, friend," he heard Stan say casually.

"Hello, hello." The little old man pulled his head out from under the hood. "Know anything about cars?"

Stan allowed that he knew a little bit. "But why don't you let Gus Wilson look at it?" he suggested hopefully.

"Who's Gus Wilson?"

Stan pointed to the sign over the garage.

"No, sir!" snapped the man. "I don't mind being stuck once, or maybe twice, but I'm not going to be a sucker for every garageman from here to Florida."

Stan peered at the engine, trying not to act like a professional mechanic. "What seems to be the trouble?"

THE old gentleman sighed. "It all started this morning. I was going up the hill just the other side of Riverton on Route 101 when the car went dead on me. I pulled off to the side of the road and turned the key in the starter switch and she started right up again. I went along for a mile or so, and she stopped again. Again, as soon as I turned the key hard over, she started up. Right in the middle of downtown Riverton she stopped again. Caused a whale of a traffic jam before I could get going again. People honking and swearing at me. I took it into a garage there and they looked it over and told me I needed new points. So I said, 'Go ahead, put 'em in,' and they did. I paid 'em, drove about a mile and the same thing happened."

"You mean the engine stopped dead," Stan probed.

"I mean *dead*," snapped the man. "This time I was going downhill. When I turned the key, it started up right away but backfired and blew out my muffler."

"It can happen," said Stan.

"So I went into another garage. This time they said I needed a new carburetor. So I said, 'Go ahead and put it on,' and they did and a new muffler, besides. I paid 'em and drove out of the place and halfway up the next hill, the same thing. Stopped dead. Just like before. So I drove into the next garage. What do you think *they* told me?"

"What?" asked Stan.

"They told me I needed a new coil and a timing job. So I let them have the car for a couple of hours and went to lunch. When I got back, they handed me a bill that nearly bowled me over. But I paid 'em and drove off. I got this far and she stopped again. I'm fed up."

"I don't blame you," said Stan. At this point he needed a conference with Gus so he added, "I'll go and borrow a screwdriver from Mr. Wilson. Maybe I can find the trouble."

INSIDE the shop, Gus was waiting for him. "Quite a tale of woe," he remarked, shaking his head.

"I don't wonder he's sore," Stan said. "What do we do now?"

"I want to hear the engine. Get him to start it up. If possible, run it up and down, back and forth."

"Know what I think the trouble is?" Stan offered. "I think he's got some dirt or water in his fuel line."

"Could be," Gus agreed thoughtfully. "But let's get the engine started."

Stan picked up a screwdriver and returned to the man and his car. "Mind starting the engine?" he suggested.

The man got in and turned the key. The engine hummed. Stan listened and looked. He could detect nothing. Above the sound of the engine, the car radio was merrily blaring full tilt.

"Drive it down the street a way," Stan requested.

THE little man had to shout. "How's that?"

"Drive it down the street a little way," Stan repeated above the din.

"Okay." The man put it in gear and the car moved forward. Nothing happened. Stan waved him to back up. The man put it in reverse and the car moved backward. About halfway it stopped. There was dead silence. The man's face appeared out the window.

"See what I mean?" he snapped.

"Yes, I see." Stan walked to the car. "Start it up again."

The key was turned, the motor roared and the radio blared. Stan was just about to look under the hood again, when the motor went dead.

In the silence that ensued, Gus ambled out of the shop. The man in the car re-



garded him with angry-eyed suspicion. "What do you want?" he demanded.

"My friend," Gus said easily, "I'm a gambling man. Are you?"

Stan Hick's jaw dropped. He had never known Gus to gamble on anything.

"Maybe I am and maybe I'm not," the old gent replied testily. "So what?"

"Just this," said Gus. "I'll bet you I can tell you what's wrong with your car. And furthermore, I can fix it."

"No sir. You aren't going to touch—"

"Just a minute, friend. Let's put it in the form of a little wager. I'll tell you what's wrong with your car if you'll let me fix it. After I fix it, you drive on your way. Don't pay me a cent. Drive as long as you want to. When you are convinced that I have taken care of the trouble, you can send me a check."

**C**URIOSITY was replacing anger, and the man said, "Well, I don't know."

"What have you got to lose?" Gus asked. "If it doesn't work, you don't pay me."

"Suppose it does work and I'm 200 miles away. How do you know I'll pay?"

Gus smiled. "I'm a fair judge of people. I don't think you'd welsh on a bet."

The man put out his hand. "You're on. Now, what's the trouble?"

"Sounds like dirt or water in the gas line to me," Stan Hicks put in.

"Nope," said Gus. "It's your ignition switch. Stan—er, young man, take my car and run down to the McDonald Agency and pick up a starter switch."

"Now a new starter switch," the old fellow taunted. "You fellows are just parts salesmen. Okay, put it in. But I think it's dirt in the gas line, like he says." He pointed at the departing Stan.

"It's my gamble," said Gus pleasantly. "Help me push it in here and we'll put in the new switch for you."

When the job was done, the little man pocketed Gus's bill and got behind the wheel. He started the engine, raced it a couple of times, and put the car in gear.

Above the noise of the car radio, he shouted:

"Where's the next garage down the line? I'll be looking for it in a few minutes."

Gus just laughed.

When the car was out of sight, Stan turned to Gus.

"How could you be so sure of yourself? It could have been any number of things. It *could* have been dirt in the fuel line. You never even looked."

"Didn't need to," Gus said. "I just listened."



*"... and then he said, 'All right, evict me. But you'll have to carry me out with the furniture.'"*

"So did I," Stan protested. "But there wasn't anything to hear. First the engine went and then it didn't."

"I didn't listen to the engine," Gus said with a grin.

**S**TAN gasped. "What did you listen to?" "I listened to the radio," said Gus.

"But what—?"

"Didn't you notice that when the engine stopped, the radio stopped?" Gus said. "Dirt in the gas line wouldn't have affected the radio. Since he had new points and a new coil, the chances were that the trouble was in the primary ignition circuit, probably in the switch itself. I checked when I installed the switch. I'm not much of a gambler," he concluded. "I just keep my ears open."

Three days later when the check arrived, Gus showed it to Stan. "Take my advice," he said. "Only bet on a sure thing."

**Next Month: Gus gets his signals switched**





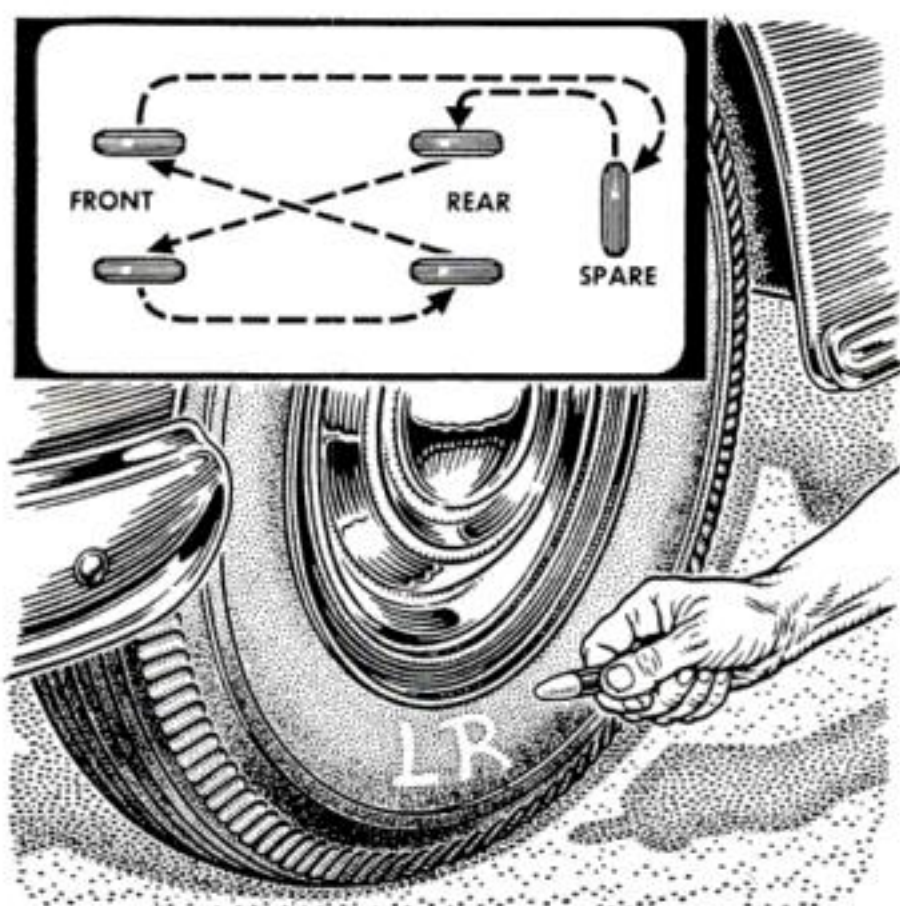
## Hints from the Model Garage



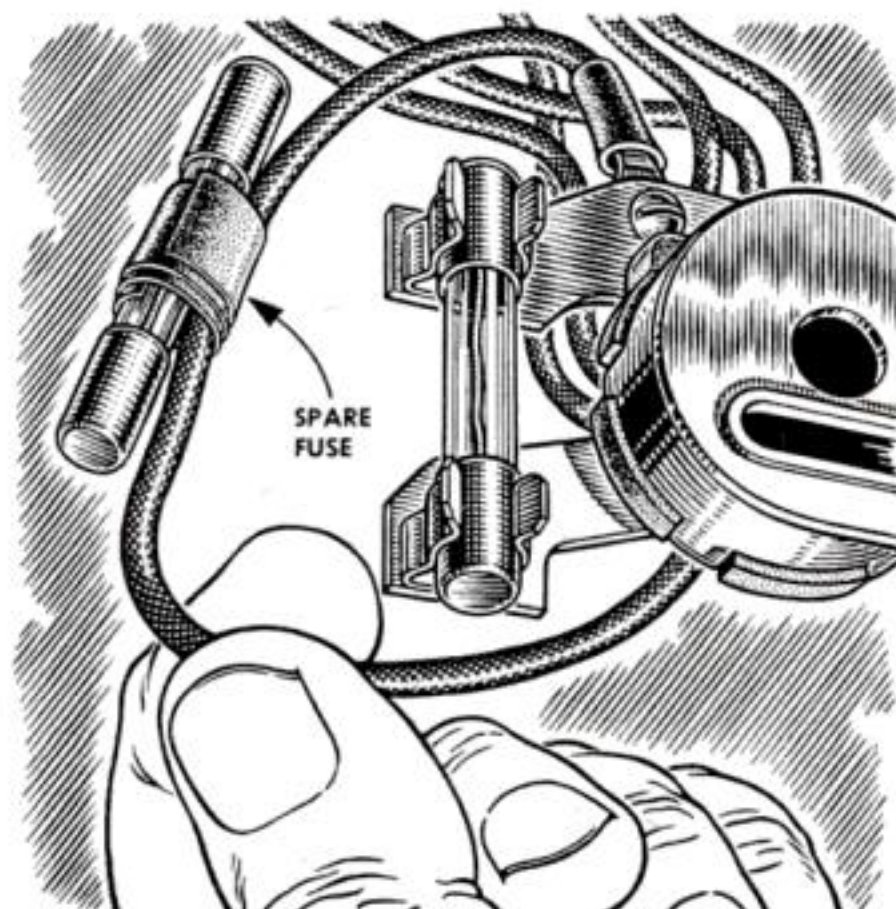
**Hold a mirror** over the cell openings of your car battery to see if the electrolyte levels are high enough. With vent plugs off, the liquid inside shows up clearly, saving you, with some models, an uncomfortable stretch under the hood.



**Glass polish** wiped liberally on the inside of your car or station-wagon windows transforms the vehicle into a private dressing room at the beach. The translucent coating is quickly rubbed off later, leaving the windows clear and sparkling.

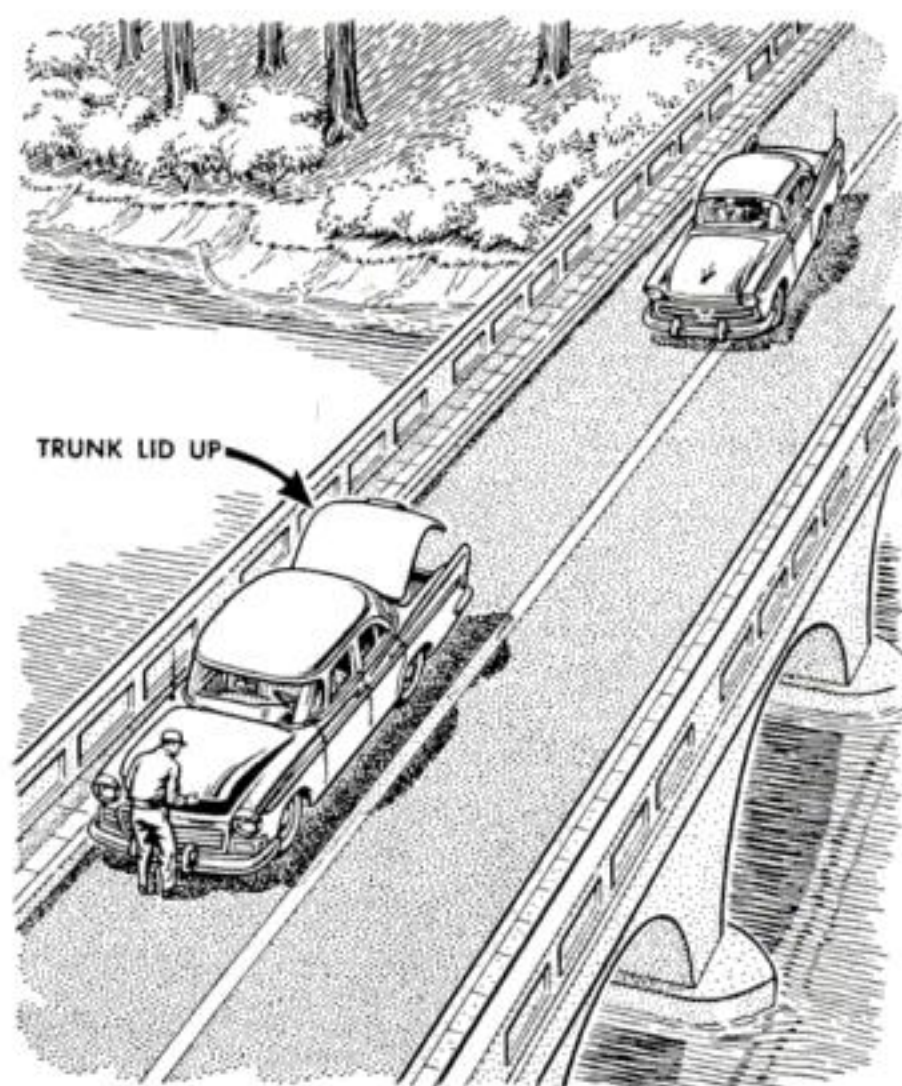


**Switching tires** can be simplified if you first mark their positions with a crayon (LR for left rear, for example). Then you can check later to see if they've been rotated properly (see sketch). Crayon won't come off during handling.

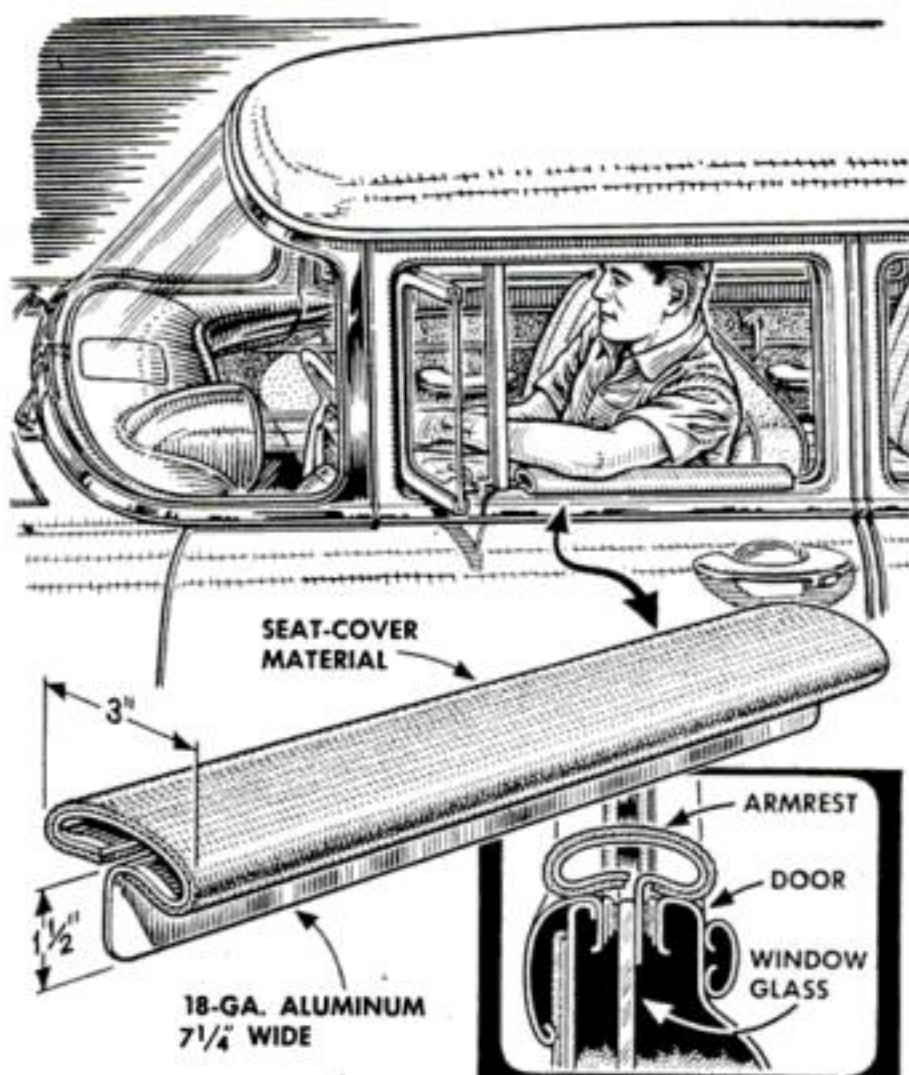


**Tape a spare fuse** on one of the wires leading to each fuse clip and it will always be handy when needed. But make sure the amperage of your spare matches that of the fuse to be replaced; amperage varies from place to place on a car.

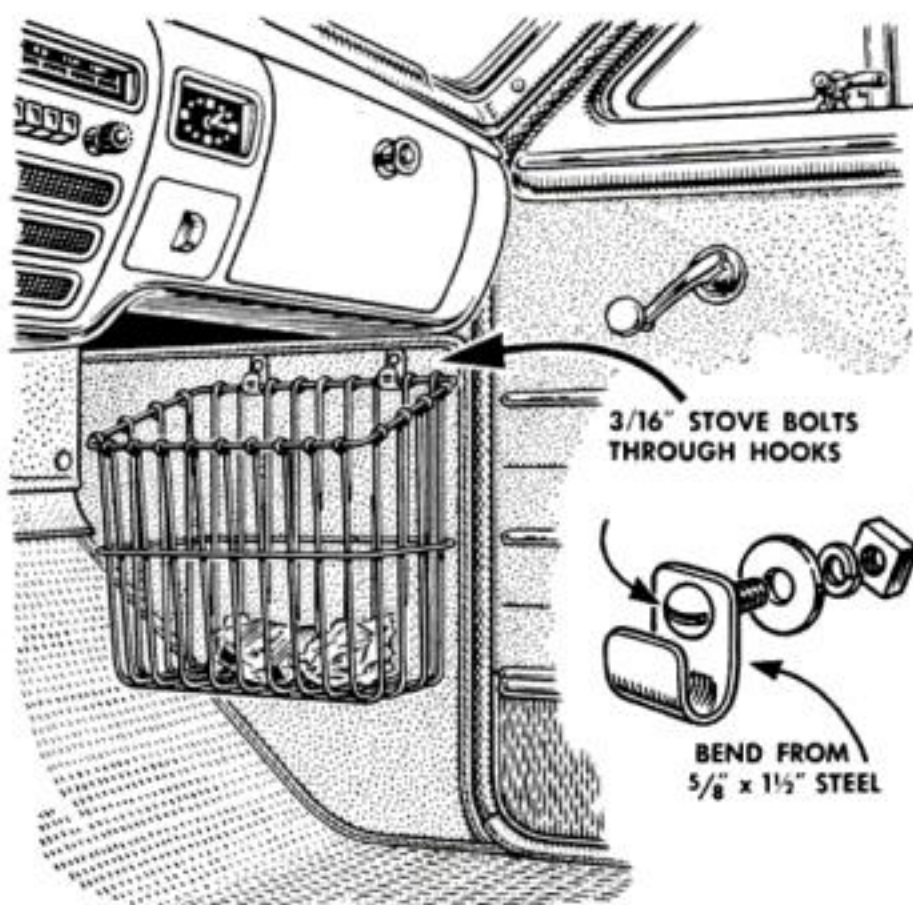




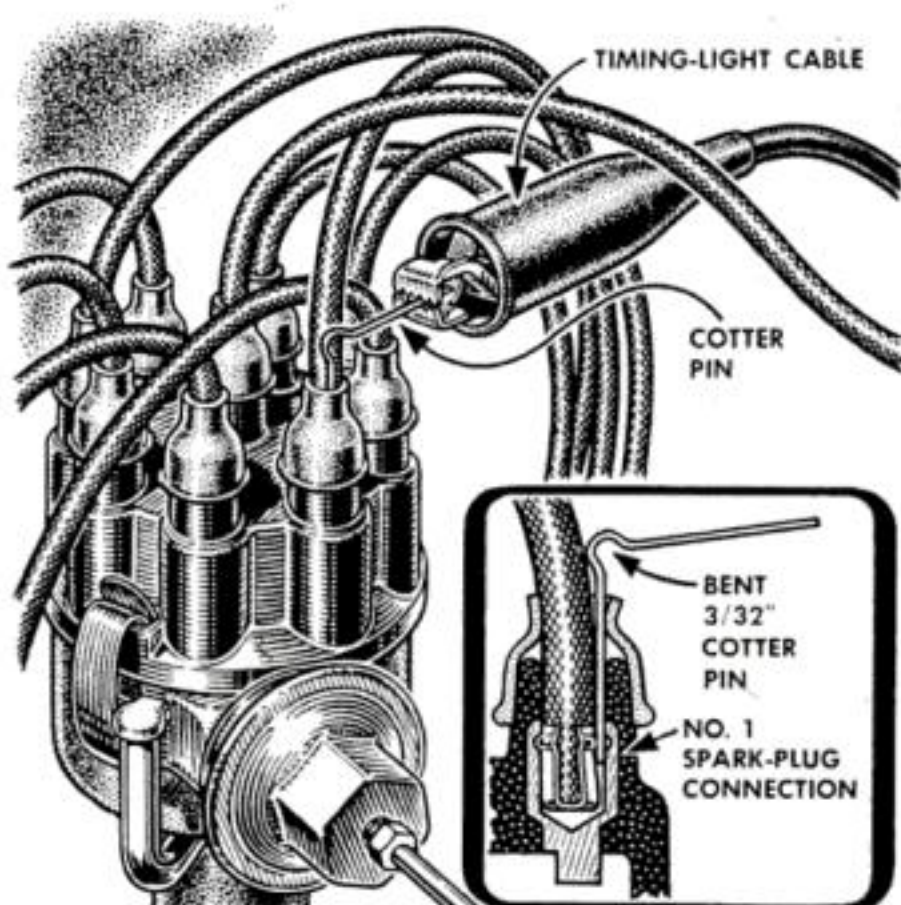
**Raised trunk lid** serves as a good daytime warning that your car is stopped for repairs. Visible a long way off, it gives other drivers time to stop or go around when you are caught on a section of road where it's impossible to pull off.



**An armrest** that fits over the window sill lets the driver rest his arm during long trips without burning it on hot car metal. Woven seat-cover material is cemented to a piece of aluminum shaped to slip between door and window glass.



**A litter container** stores family trash until it can be emptied at a service station or at home—instead of on the highway. A bicycle basket hangs from hooks bolted to a panel under the dash and is easily removed and replaced.



**Hook up a timing light** quickly with a bent cotter pin. One leg of the pin slips into the distributor cap's No. 1 spark-plug socket; the timing-light cable clamps on the other. The distributor is often easier to reach than the plug.

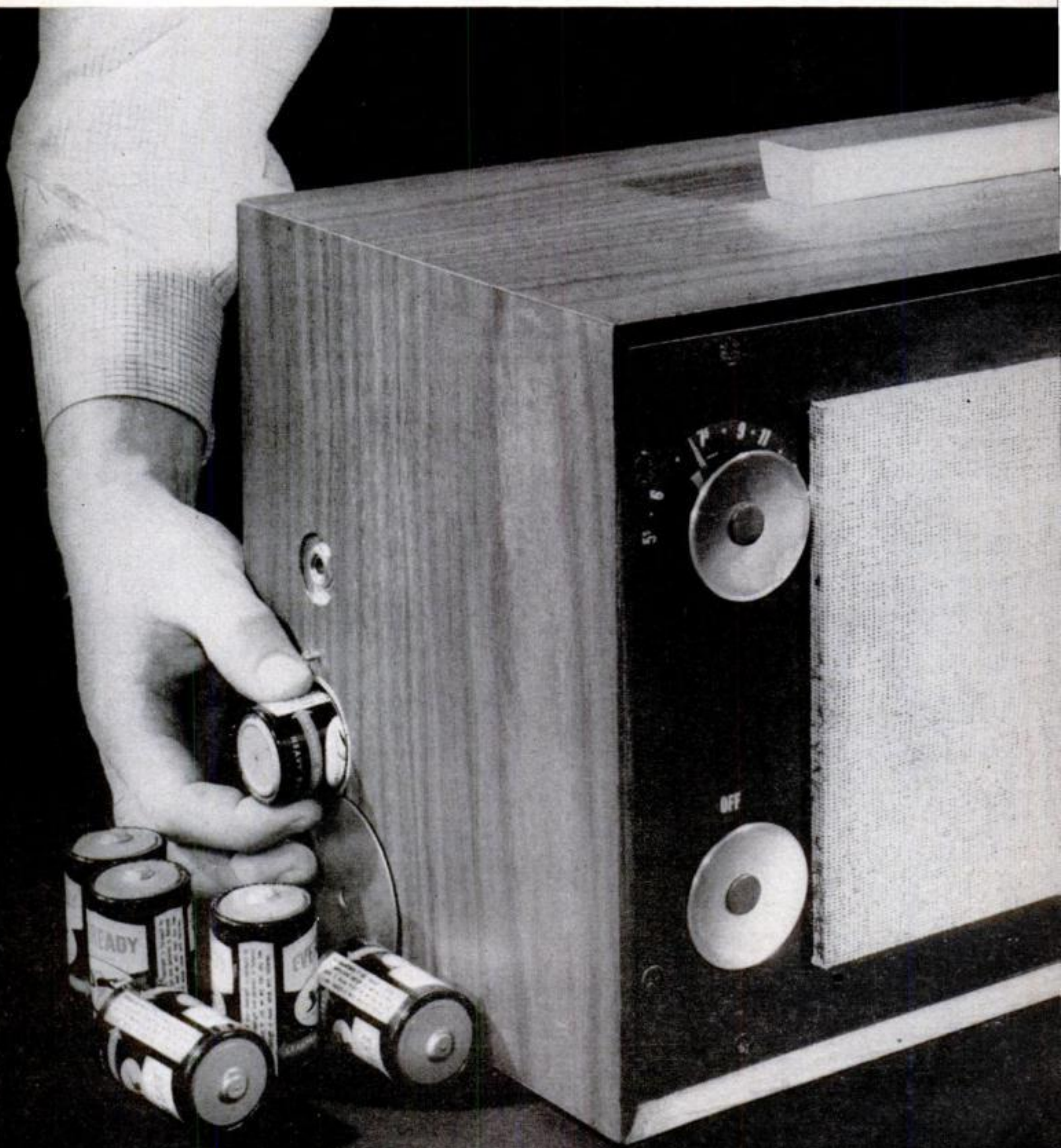


**Home  
and  
Shop**

# Tomorrow's

***A forerunner of sets that will be news next year,  
this transistor superhet you can build has console  
tone quality and will play anywhere you like***

**By the Staff of Popular Science**





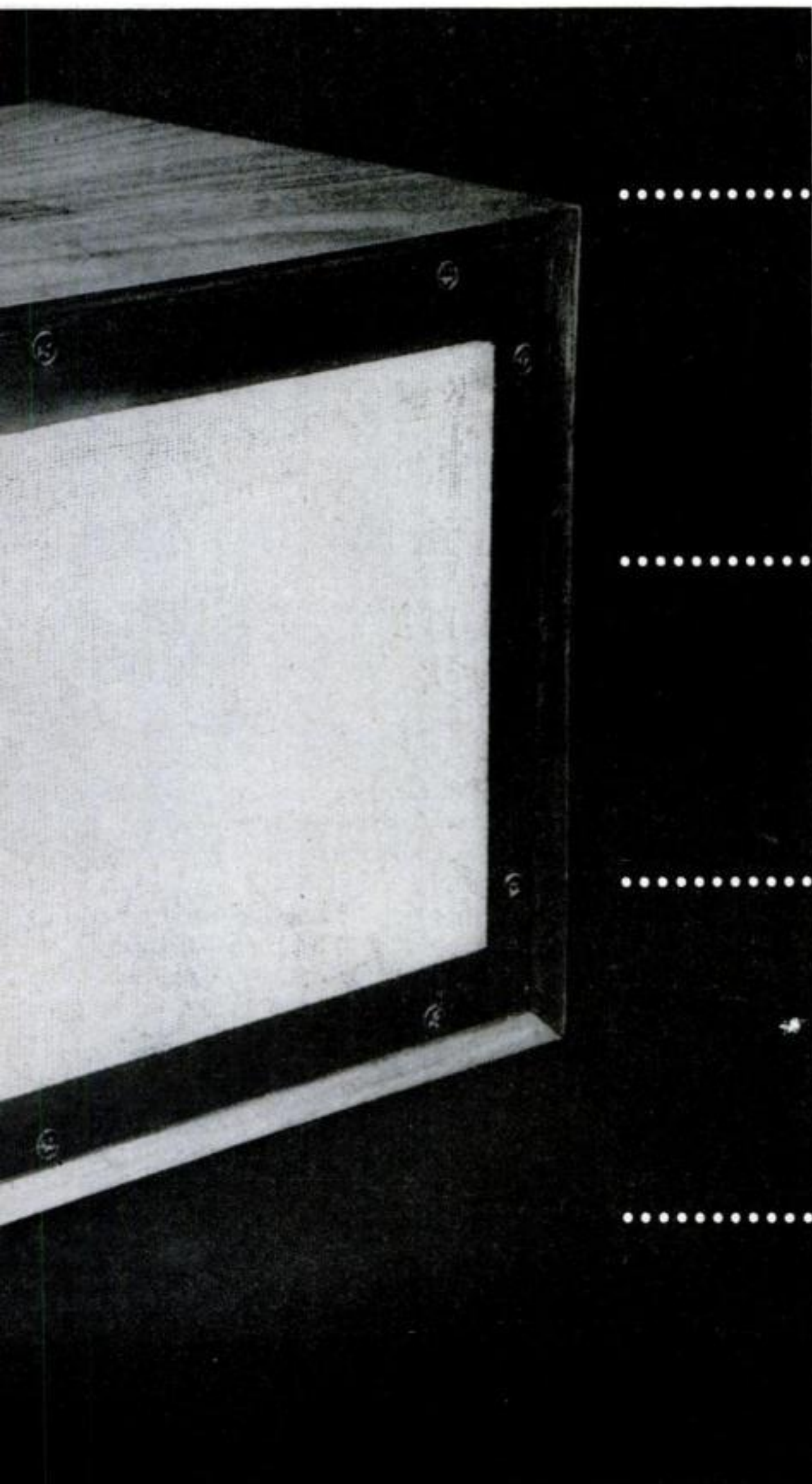
# All-Purpose Radio

**T**HIS is the radio in your future—the kind of set that will make sales news next year. Exciting in concept, thrilling in performance, it adds new dimensions to radio listening.

It's so good that it outmodes big con-

soles, yet so compact you can take it on a picnic. These dream features make it more useful than three ordinary radios:

- It has no cord to plug in. You can play it anywhere.
- Its carefully designed bass-reflex



**It has rich, rounded  
big-console tone**

*A specially designed  
bass-reflex cabinet gives  
quality reproduction  
in compact size*

**No dangling wires or  
cords to plug in**

*Antenna and power  
supply are built in. You  
need no electric outlet. It  
plays wherever it goes*

**The batteries are cheap  
and easy to get**

*Six flashlight cells will  
run it for weeks, at  
no more than the cost of  
operating a big radio  
on house current*

**Less noise, no hum,  
and instant starting**

*All power-line static  
is eliminated. Playing  
starts at once, with  
no wait for warmup*



type cabinet delivers rich, big-speaker tone.

- It gets all the stations, with all the volume you want.
- It runs on cheap flashlight cells.

**Here is convenience**, unhampered by dangling wires or any need for house current. Play this set on your workbench, let the children carry it elsewhere for their own programs, listen to the ball game in your garden lounge, take it when you go fishing or vacationing far from power lines.

**Here is full-bodied tone**, such as you'd expect only from much bigger speakers. The entire cabinet is a specially modified, tuned bass-reflex enclosure.

**Here is economy** that only transistors can give. You never buy costly B batteries, don't have to feed current-burning tube filaments. All the set takes is six D-size flashlight cells, available anywhere. The transistors will last indefinitely.

**Here is performance**. Even the lower-powered stations come in loudly enough to enjoy. Pickup is so good you get reception inside steel-frame buildings or in automobiles. Playing starts the instant you turn the switch.

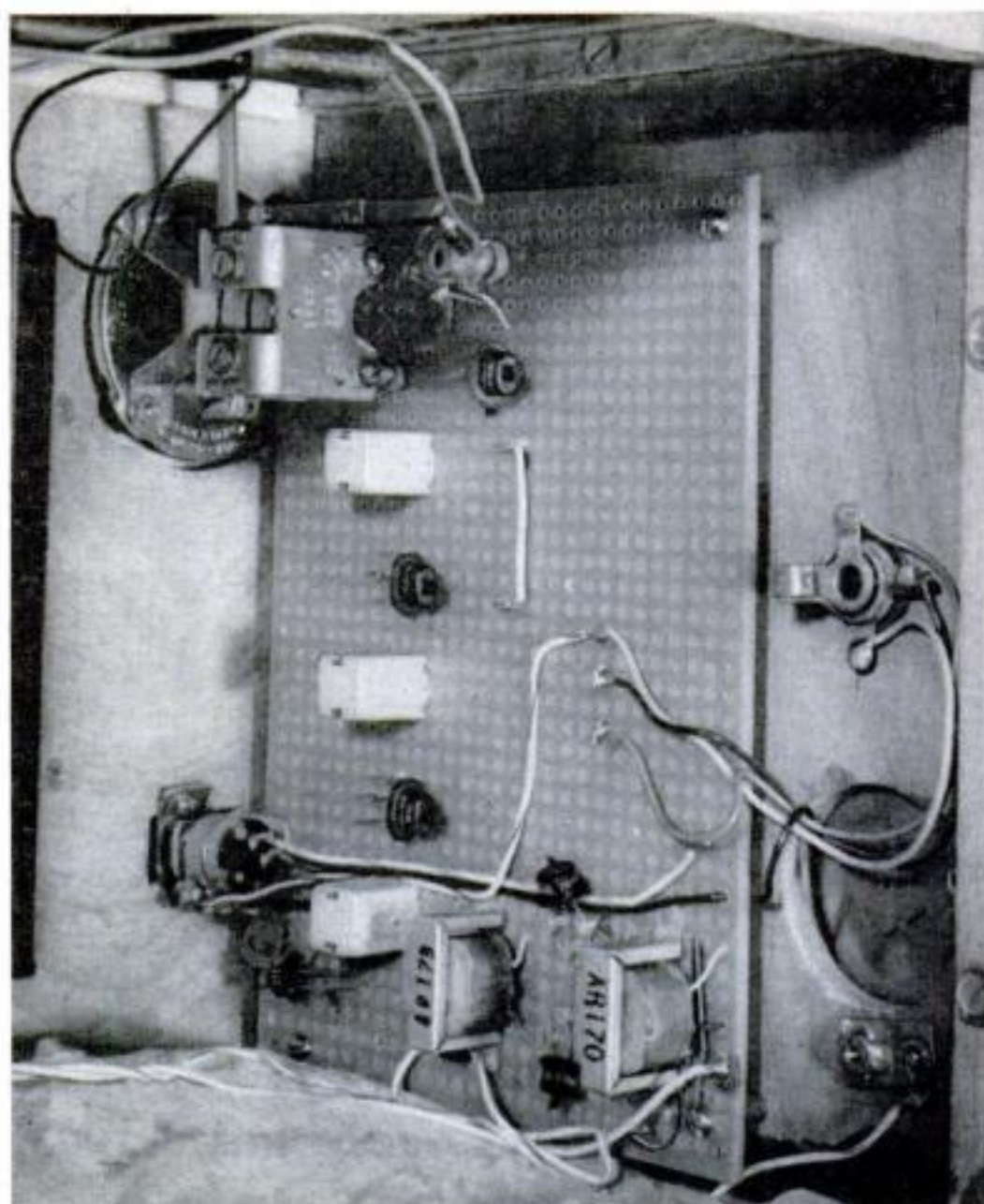
**Here is safety**. You can let the children use it freely; they'll never get shocks from a "hot" chassis or by plugging into a wall socket. It's completely safe for use in the bathroom, where AC sets can be a deadly shock hazard.

**Here is quality**, in a highly stable superhet circuit with two I.F. stages, an A.F. driver, automatic volume control, and a transformer-coupled push-pull amplifier. Inverse feedback helps insure high-quality output. The class B amplifier draws current in proportion to the volume; at low volume, you save juice.

You cannot buy a set like this yet. But if you can use a soldering iron and follow a wiring diagram (or are willing to learn), you can build this forward-looking receiver now. All chassis parts (price: about \$38) can be bought by mail.\* The cabinet is a straight woodworking job that can be built with hand or power tools.

**You might swap** skills with a friend. One of you may prefer to build two chassis, and the other two cabinets. You'll find that no matter how many other radios there are in your home, this one will become the favorite.

\*Lafayette Radio, 165-08 Liberty Ave., Jamaica 33, N. Y.



**PANCAKE-LIKE CHASSIS** fits flat against the end wall, with the phono jack and battery tube (here removed) beside it. Front panel is recessed for vernier tuning control (top left).

## How to build the

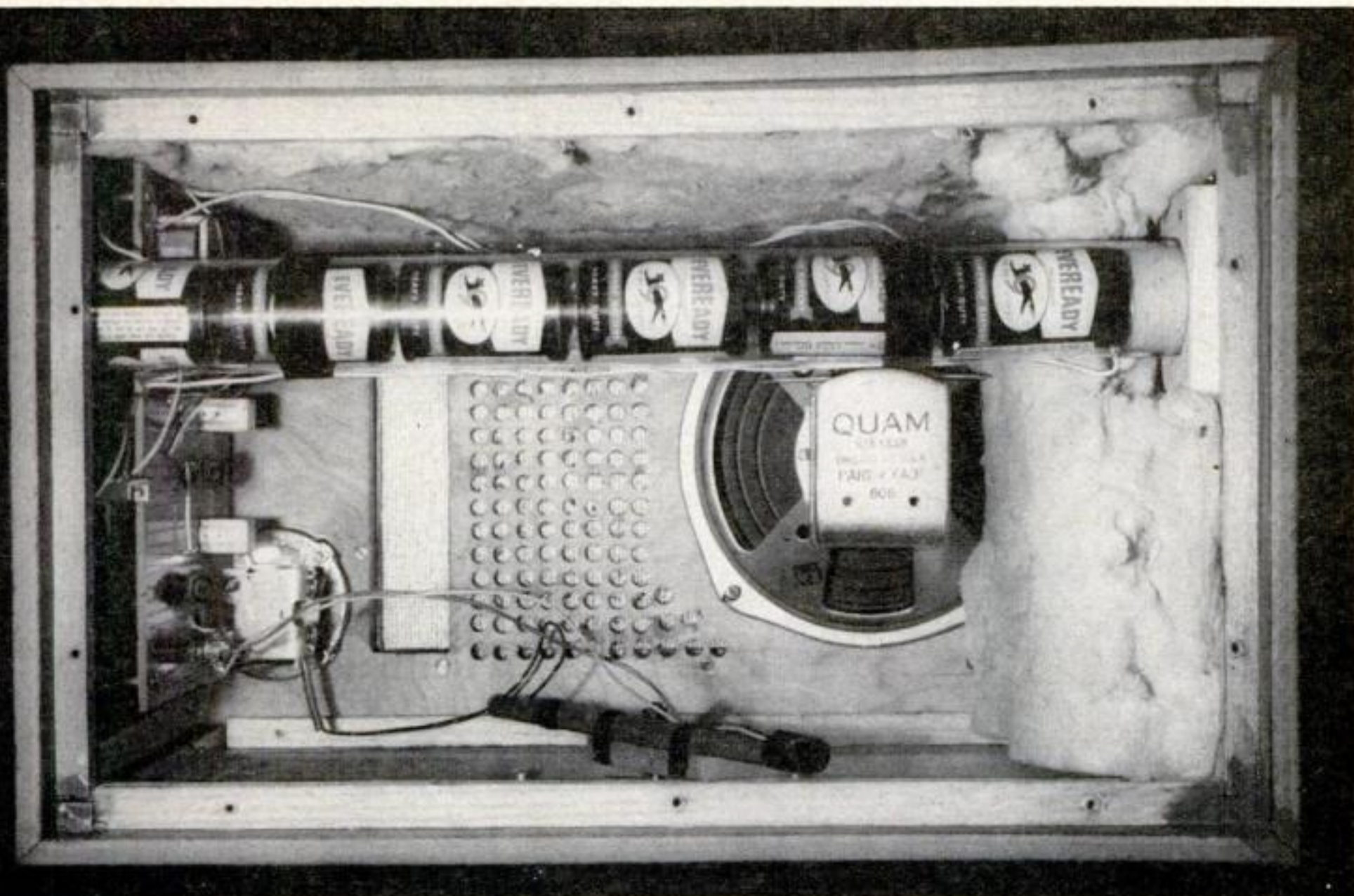
**T**HIS circuit was developed by General Electric engineers for the GE transistors specified. It has been built and checked by POPULAR SCIENCE.

For the chassis, use two thicknesses of 1/16" perforated phenolic. The 1/16" holes in this material are handy for eyelets, flea clips and the passage of wires.

Match the holes in both pieces exactly before cutting them to 5<sup>3</sup>/<sub>8</sub>" by 7<sup>1</sup>/<sub>4</sub>". Join them with an eyelet at each corner and one in the center. (If holes are tight for eyelets or flea clips, run a No. 52 drill through.) Countersink each eyelet hole slightly on one side, insert the eyelet from the other, and spread it with a center punch.

**Cut tie straps** 3/8" wide from shim brass or bronze weatherstripping. Sandpaper both sides and rivet them to the underside of the chassis with eyelets 2" apart. Join one running along the front edge and one along a side at the corner as shown in the chassis photos. This is





**CABINET IS MOSTLY SPACE**, as this photograph from the rear shows, to insure good speaker performance. The battery tube used here is clear plastic, but a common cardboard mailing

tube will do. To play phonograph records, plug in a high-output ceramic or crystal pickup. The closed-circuit jack automatically cuts the tuning circuit off from the amplifier section.

## Popular Science radio of tomorrow

the ground strap. Rivet the battery strap (plus) near the center of the chassis. Run one mounting bolt of each A.F. transformer through the ground strap.

Enlarge four holes at the chassis corners for small wood screws. Cut three rectangular openings for the I.F. transformers with a fine coping-saw blade.

**Mount the tuning condenser** with either small angle brackets or spade lugs—bolts with an eye instead of a head. Fasten these to the condenser frame with very short 6-32 bolts (for which the frame comes tapped). Be sure the bolts are not so long as to touch the rotor plates.

Run a nut up the same distance on each spade lug to space the condenser off the chassis. Tighten a second nut on each lug under the chassis, putting a soldering lug under the nut nearest the ground strap. Take care not to distort the condenser frame by pulling the nuts up unevenly. Solder the lug to the strap.

Attach the I.F. transformers by bend-

ing their mounting ears back inside the chassis. Connect the ear on each transformer to the ground strap with bare wire.

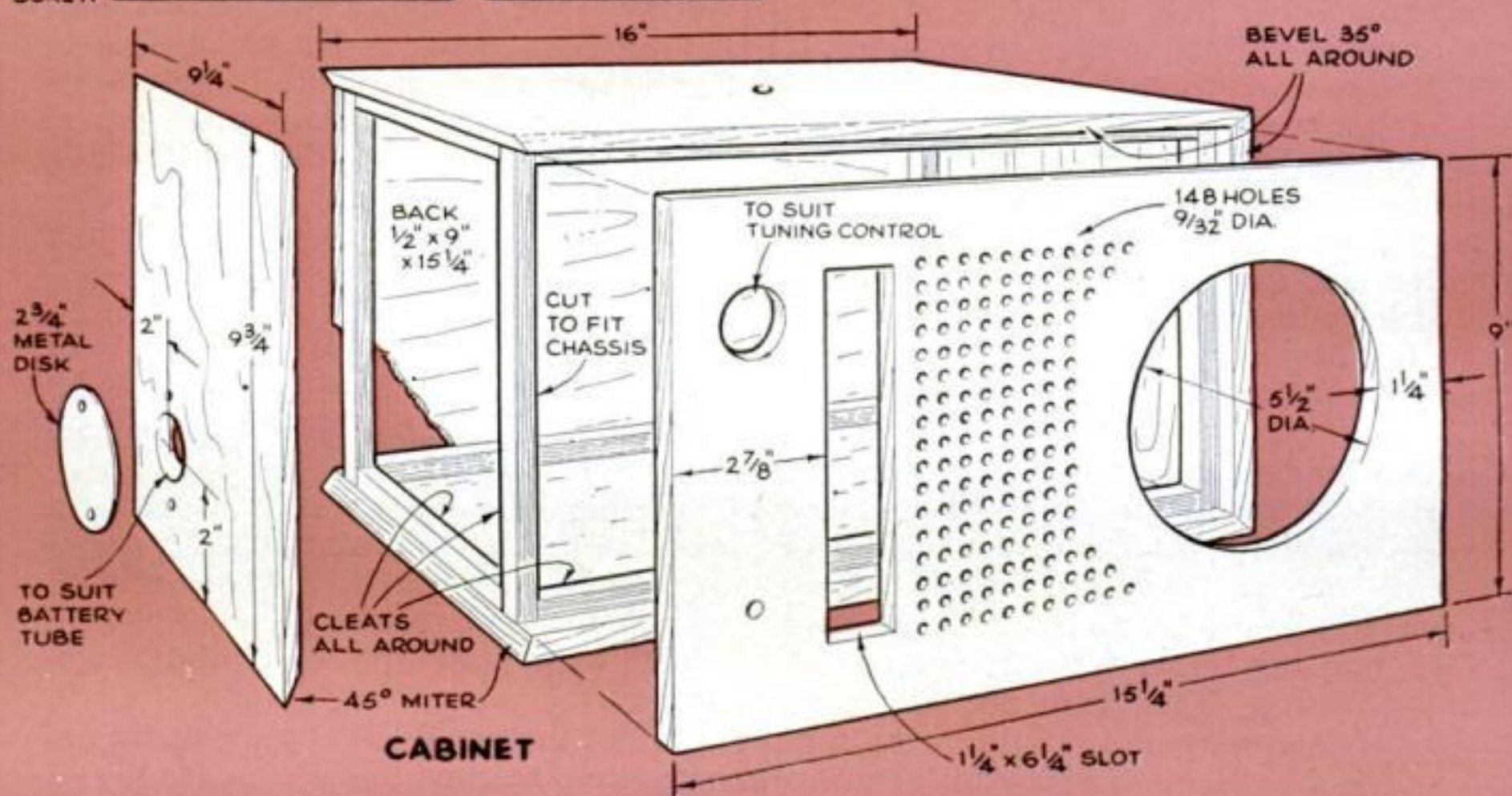
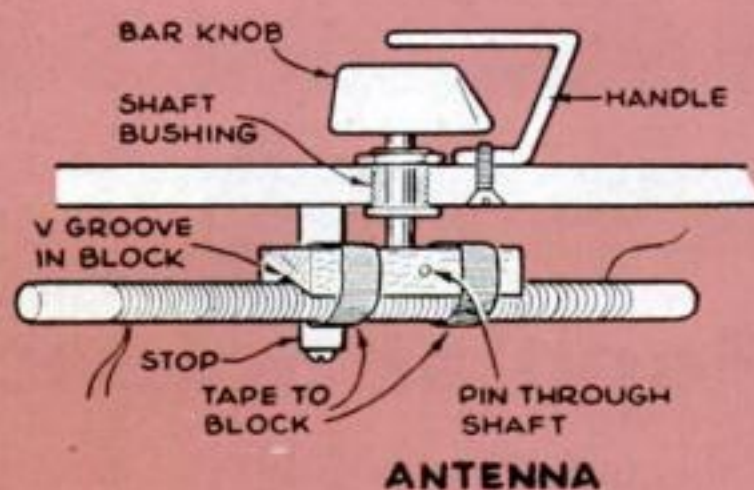
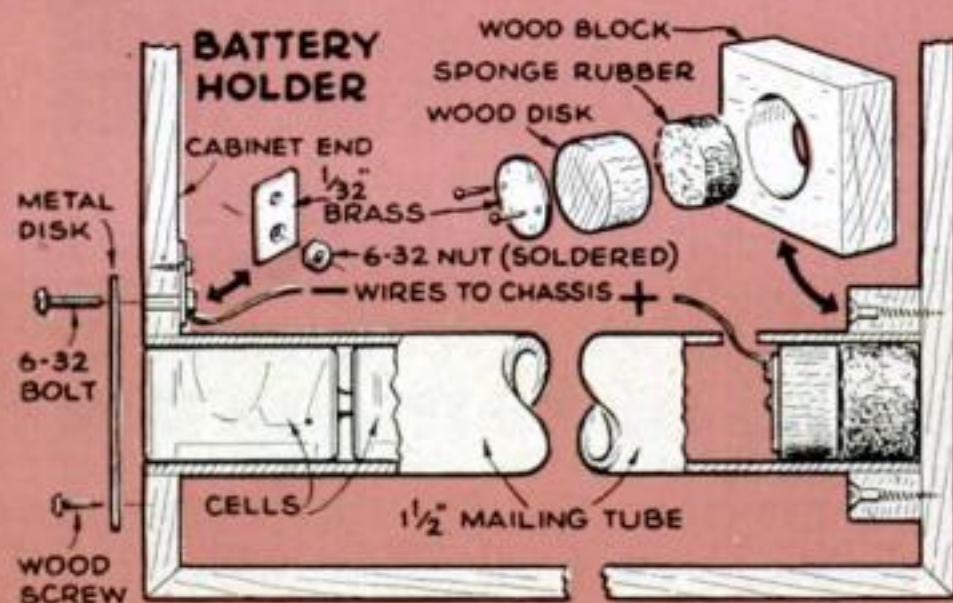
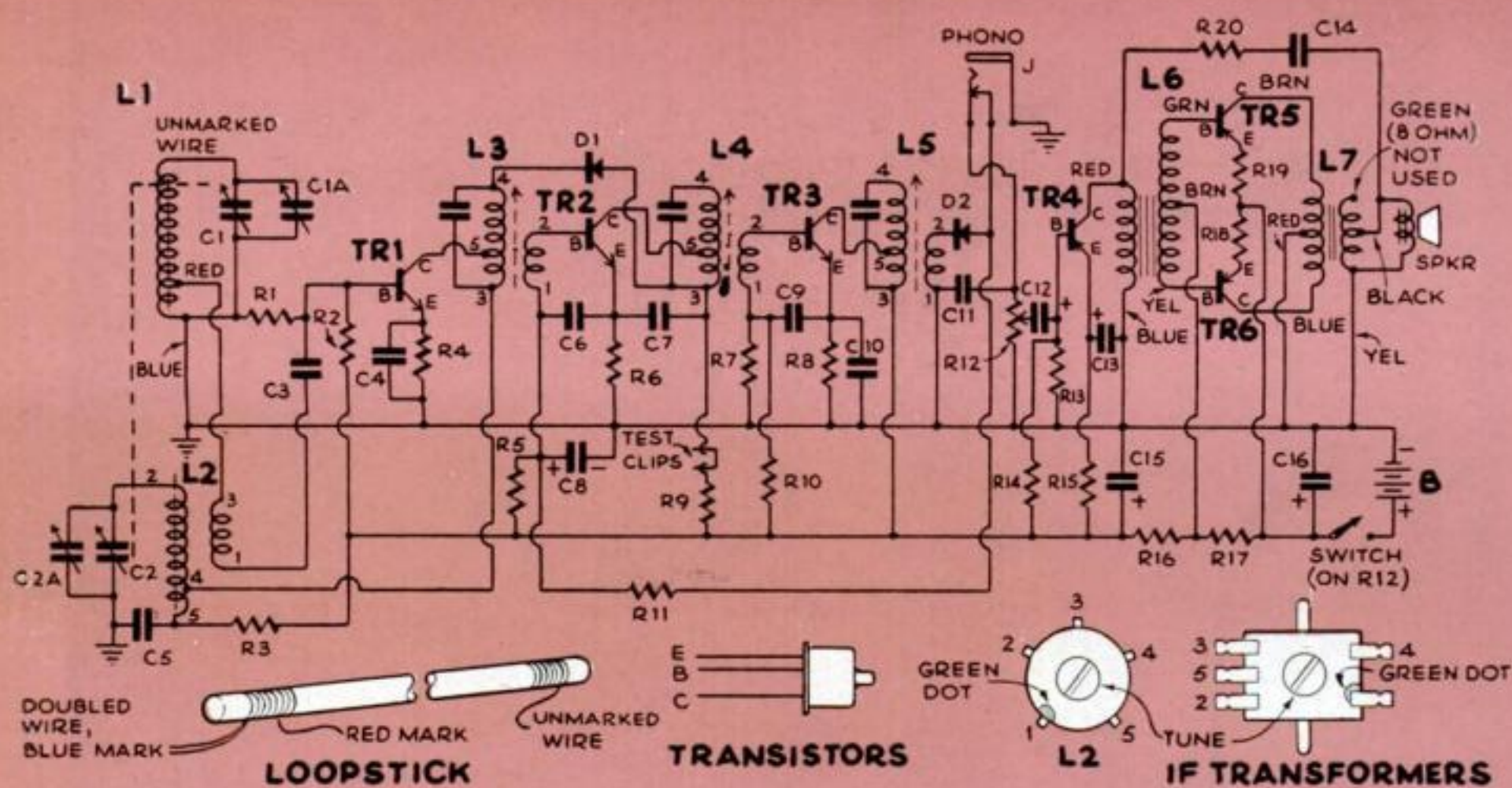
**Flea clips** serve as transistor sockets. Simply push the clips into chassis holes, spacing two abreast but one hole apart, and the third between them in the next row. Spring tension and the connections soldered to them underneath will hold the clips securely in place.

Paint a red dot on the chassis near the clip to be used for the collector lead of each transistor. To avoid mistakes, it's well to identify each transistor position by number as well.

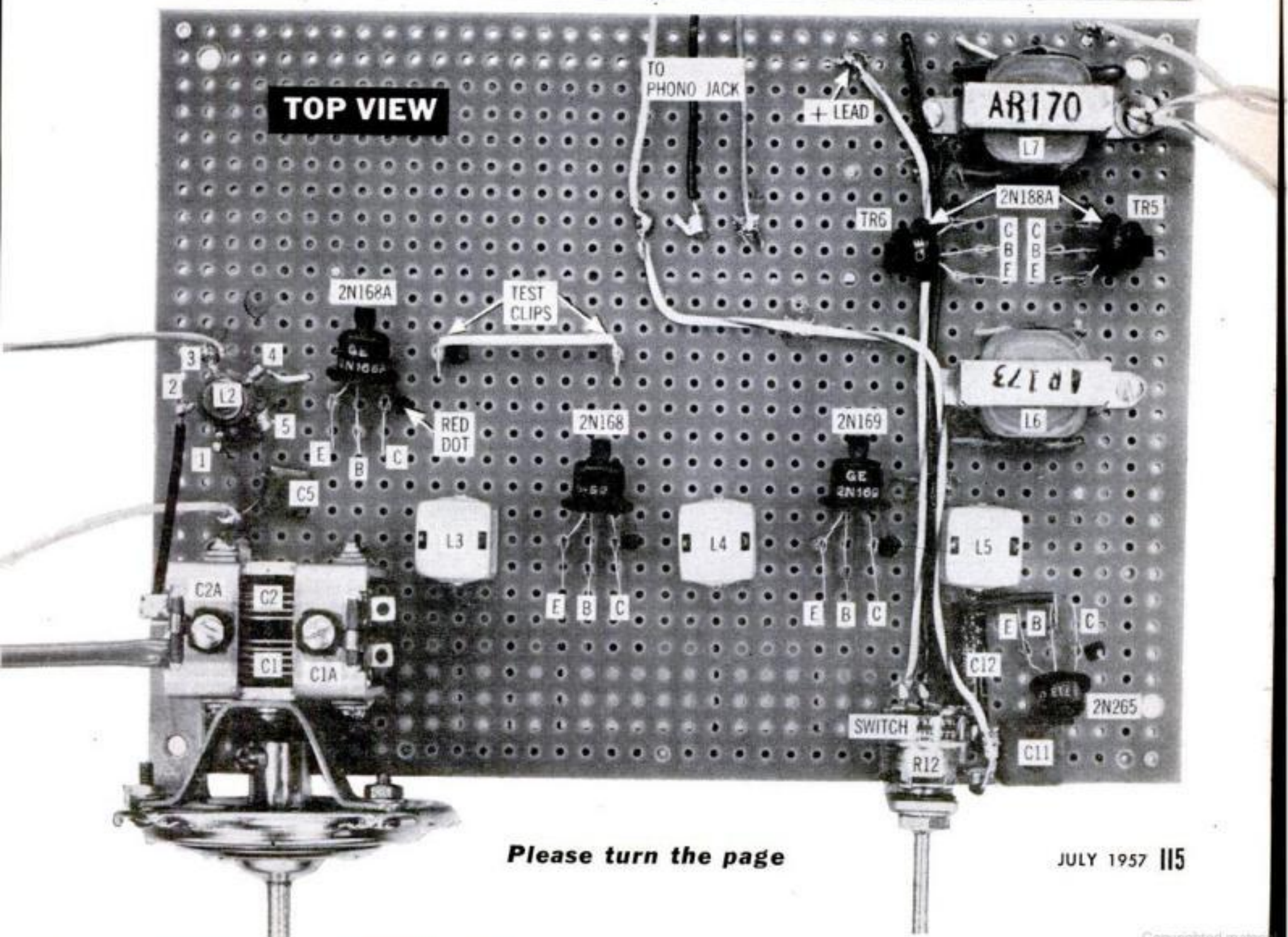
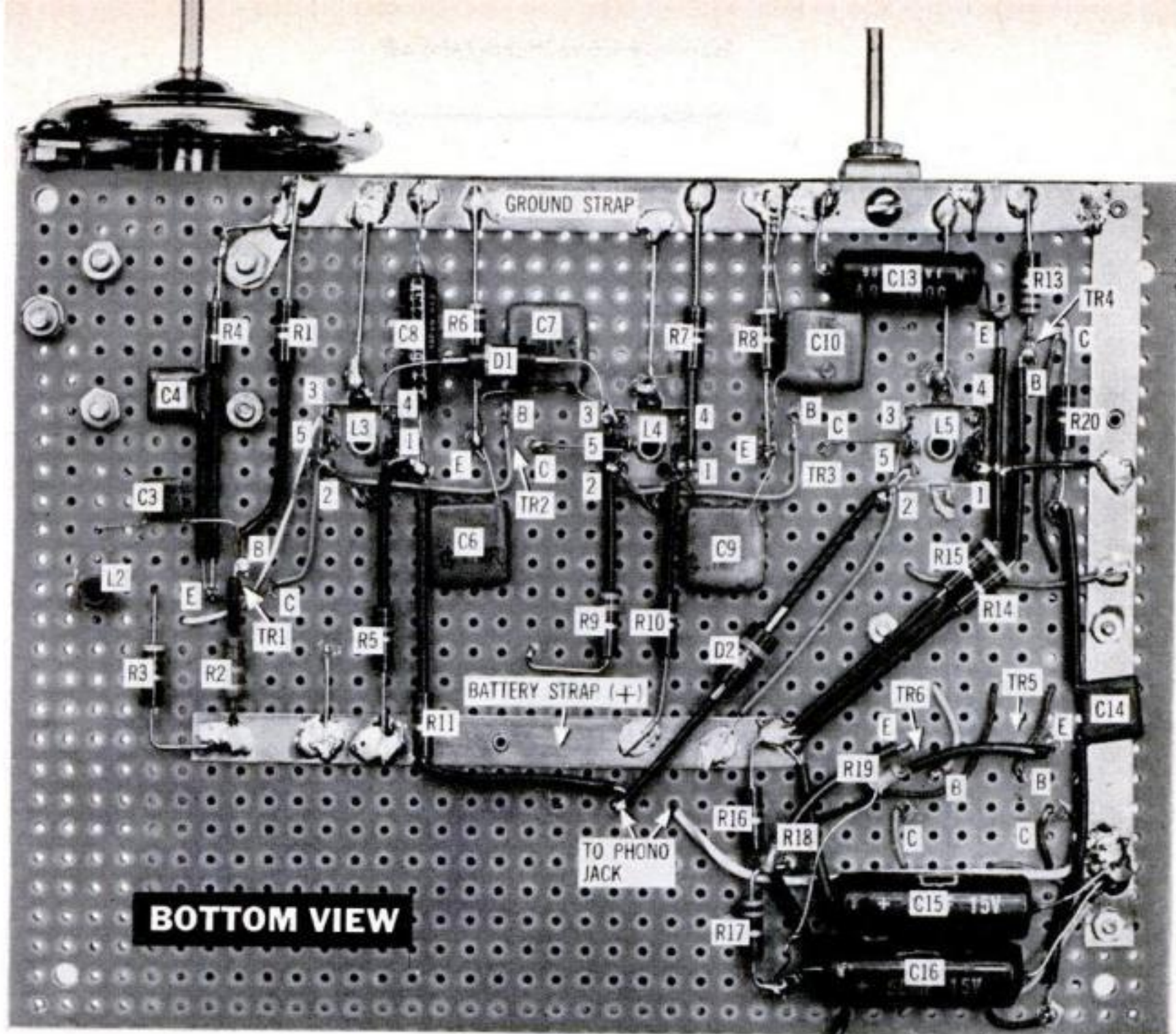
**Wiring the chassis** is very easy, for most of the parts are attached by their own leads. Use spaghetti wherever wires cross. Be sure to observe correct polarity when wiring in the electrolytic condensers.

Orient the two diodes by the arrow and base line marked on them exactly as these are in the drawing. Insert two flea









*Please turn the page*



## Tuning the Cabinet with the PS Test Record

IF ANY changes are made in the speaker or cabinet, tune the latter as follows:

Connect the speaker through a 20-ohm resistor in one voice-coil lead. Hook a low-reading AC voltmeter across the speaker terminals to help you locate resonance peaks. Play the 200-to-20 cycle glide band of the POPULAR SCIENCE Hi-Fi Test Record\* through the amplifier, with the speaker lying face up on the table, to note its free-air resonance point (when the meter jumps).

Install the speaker and fasten the back to the cabinet. Bring the wires out through the port opening. You should now detect two peaks when you play the test record, one at a higher and one at a lower frequency than the free-air resonance. Read the output difference between the peaks on the meter. If the higher frequency peak is greater, drill more holes. If the lower frequency peak is greater, plug about a fifth of the holes. Try to get both peaks at about the same amplitude.

\*Available at \$3.50 for one record, \$5 for two, from your dealer; or send to Magazine Services, Inc., Dept. 757, 104 E. 26th St., New York 10, N. Y.



clips a few perforations apart. Connect one to L4; the other to ground as shown in the diagram. Normally shorted with a bit of wire, these permit a meter to be inserted for alignment.

**Check all your wiring** very carefully or have another person do so for you, for wrong polarity can ruin transistors. Take care to insert transistors with the collector lead in the flea clip designated by the red dot.

Three of the transistors are PNP's (4, 5 and 6) and the others are NPN's. They must be inserted only in their correct positions. A PNP in a socket wired for an NPN will be ruined, and vice versa.

**Adapt the loopstick** by unwinding 15 turns from the untapped end (with the single lead coming from it). Cut off excess wire and solder flexible wire of three different colors to the three winding leads. The stranded wire wound on the loopstick need not be stripped; simply hold a clean, hot soldering iron on it long enough to burn off all insulation.

Take pains, however, to connect *all* the strands when soldering on the flexible leads; dropping even one will change the antenna characteristics. Tape the joints to the core. The two leads from one end may be twisted together, but keep the single lead clear of the others.

**Pivot the loopstick** to use its directional effect on weak stations. Groove a little wood block and pin it to a short  $\frac{1}{4}$ " shaft. Tape the antenna on tightly and fit the shaft into a bushing fixed in the cabinet top. To limit rotation, drive a wood screw with a bit of rubber tubing on it into the underside of the top where the ends of the block will strike it. Fasten a bar knob to the top of the shaft.

The battery casing is a  $1\frac{1}{2}$ " mailing tube, cut to cabinet length and held in a wood block at one end and in a hole in the opposite wall. Two thicknesses of kneeling-pad rubber provide contact tension. Cells must be inserted with their center contact first; it may be well to letter this under the closure disk.

**Align the chassis** while it is out of the cabinet. Connect the speaker and lay the antenna about 6" from the set. Attach a 1-ma. meter to the test clips.

The three I.F. transformers come approximately tuned to 455 kc., and if you have several strong stations in your vicin-

[Continued on page 196]



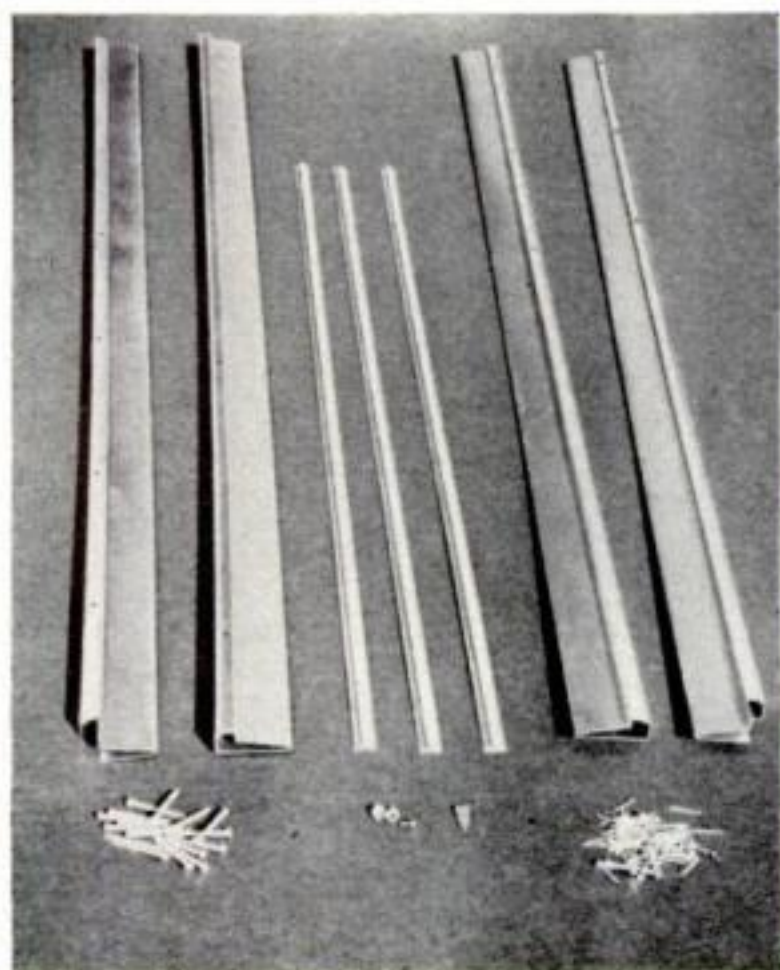
**Using a new kit of parts, you can change standard, double-hung sashes to the convenient modern type**

# How You Can Have Lift-Out Windows

**By Bob Gilmore**

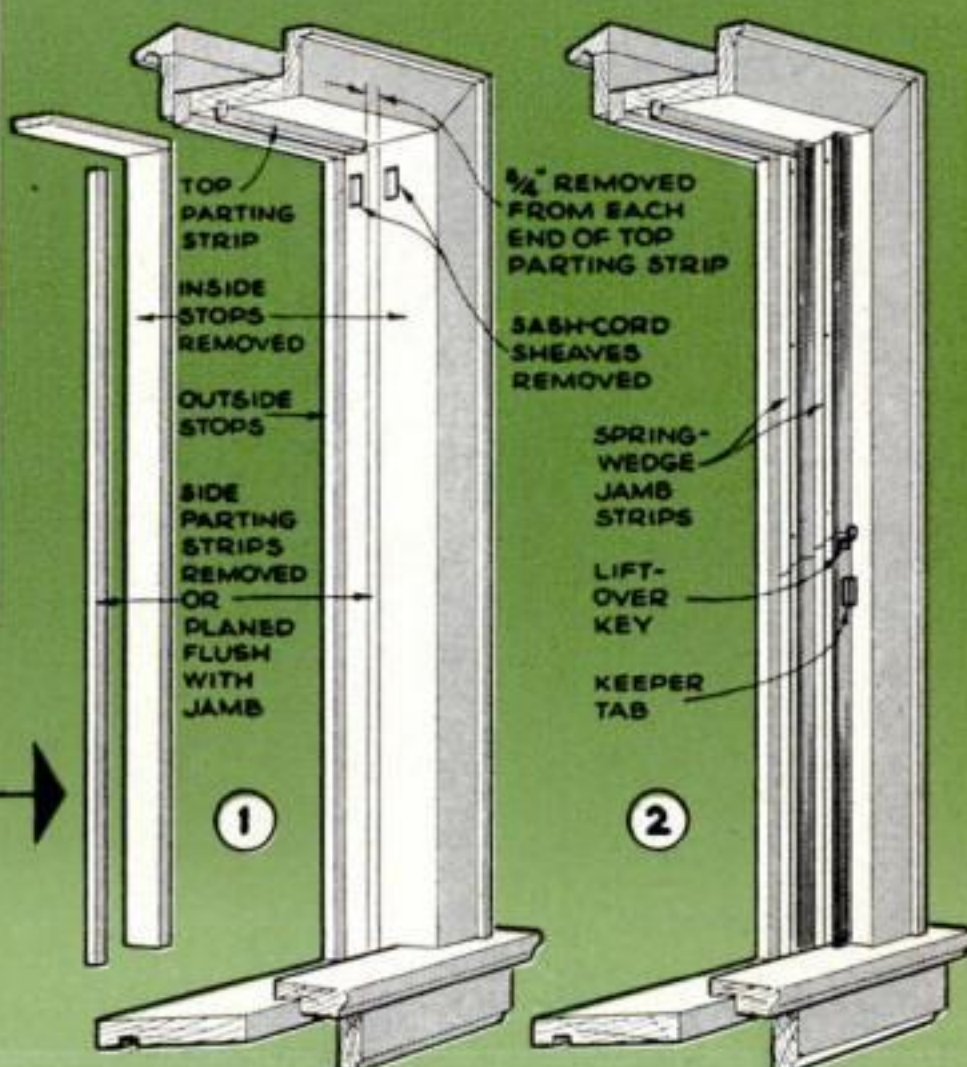
**T**HE latest thing in window convenience is the window that lifts out—inside the house—for easy cleaning, painting or repair. You can now have

this convenience with old windows. Using a new conversion kit, you switch double-hung wood sash to the lift-out type. New aluminum jamb strips, available in many stores, are made by Winseal Mfg. Co., 418 Commonwealth Annex, Pittsburgh, Pa.



## WHAT YOU GET

**KIT CONTAINS** four oversize jamb strips which you cut to size to fit the window, three pieces of weatherstripping (center), a lift-over key, a keeper tab, and assorted screws and nails.



## WHAT YOU DO

**TO MAKE THE CHANGE,** first alter or remove the parts shown (1) of a conventional window frame. You then install spring-wedge retaining strips (2) for the old sashes. On the right side of the frame, the lower sections of these strips are held by a keeper tab. You pull out these sections to remove the sash from the window.

## HOW YOU DO IT

**PLEASE TURN THE PAGE**



**Conversion of a window to lift-out type is a 12-step job .....**



**1 REMOVE WINDOWS.** To do this, pry off inside stops and remove or plane off vertical parting strips. Cut  $\frac{3}{4}$ " off each end of top parting strip. Do not remove the outside stop strips.



**2 DISCONNECT SASH CORD** or balance tape. If sash is weighted, let the weights drop. Pry out sheaves or spring balances. Don't worry about holes; the new strips will cover them.

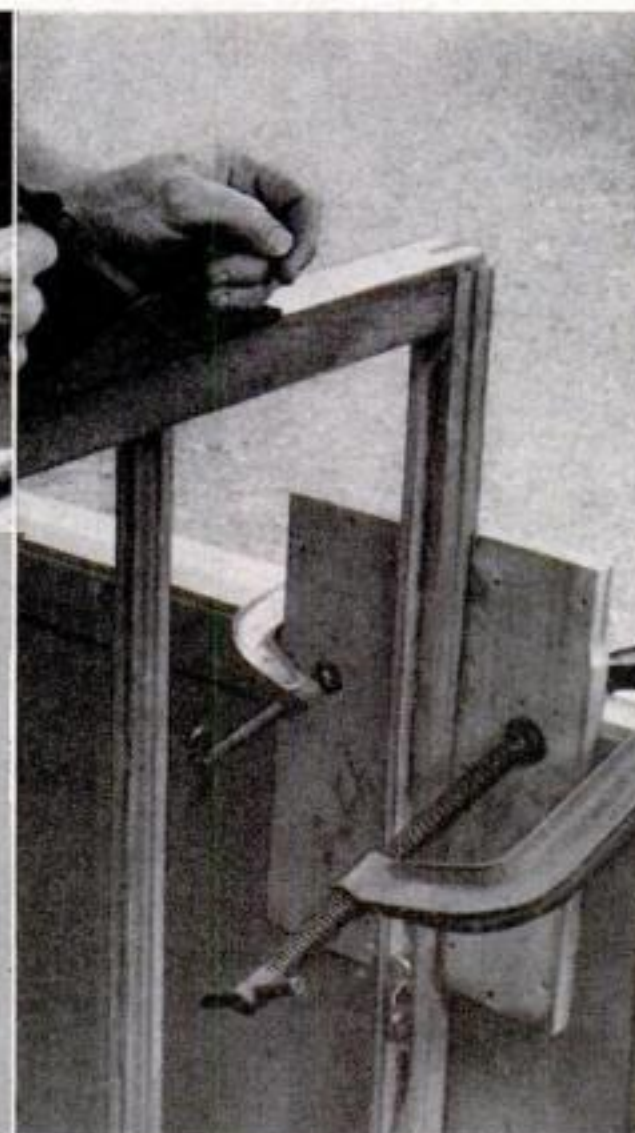
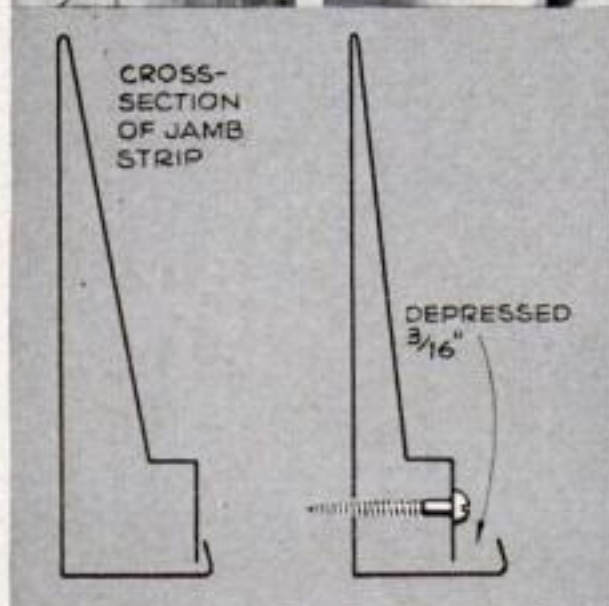


**3 MEASURE HEIGHT,** head to sill, for new jamb strips. Allow for slope of sill (outer jamb strips must be longer than inner ones). Bottom ends of the strips will be trimmed on bias.

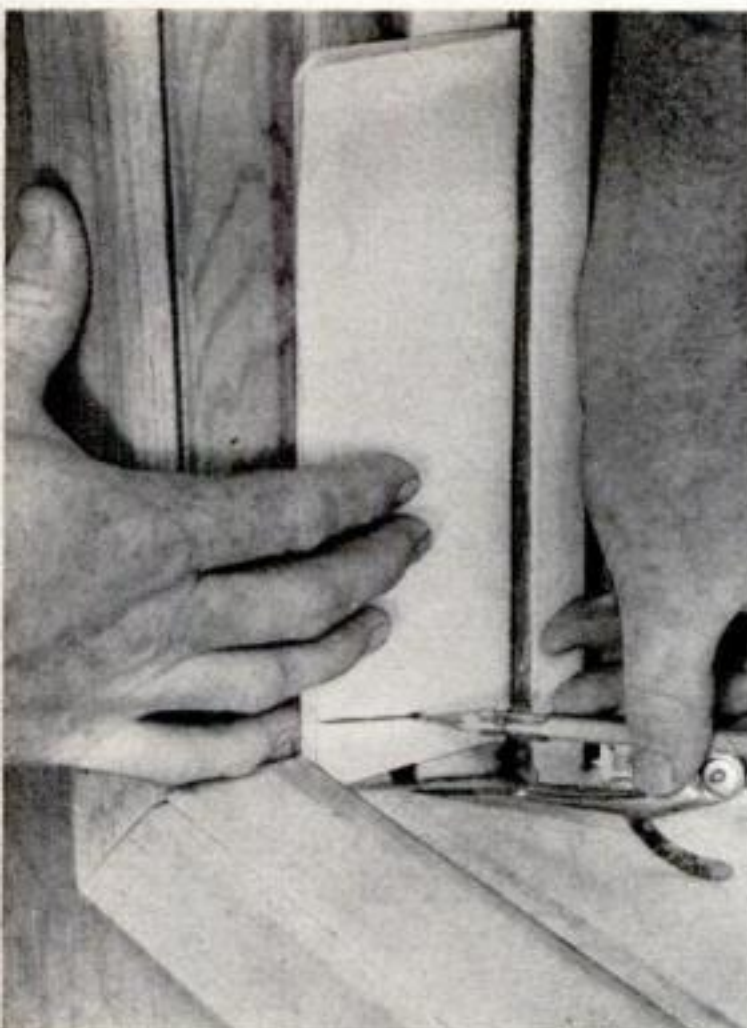
**7 SCREW LEFT-HAND STRIP** in place. Drive the screws until the spring section is depressed about  $\frac{3}{16}$ ". (Later you may have to back the screws out a bit to adjust final tension.)

**8 BEVEL SIDES** of both sashes slightly, to conform with contacting faces of depressed jamb strips. With right strip still not in place, sash should clear the right jamb by about  $\frac{1}{4}$ ".

**9 CUT RIGHT-HAND JAMB STRIPS** in two about 2" above top of inner sash. Slant cuts and stagger them. Secure upper halves to jamb with screws. Back lower halves with keeper tab.



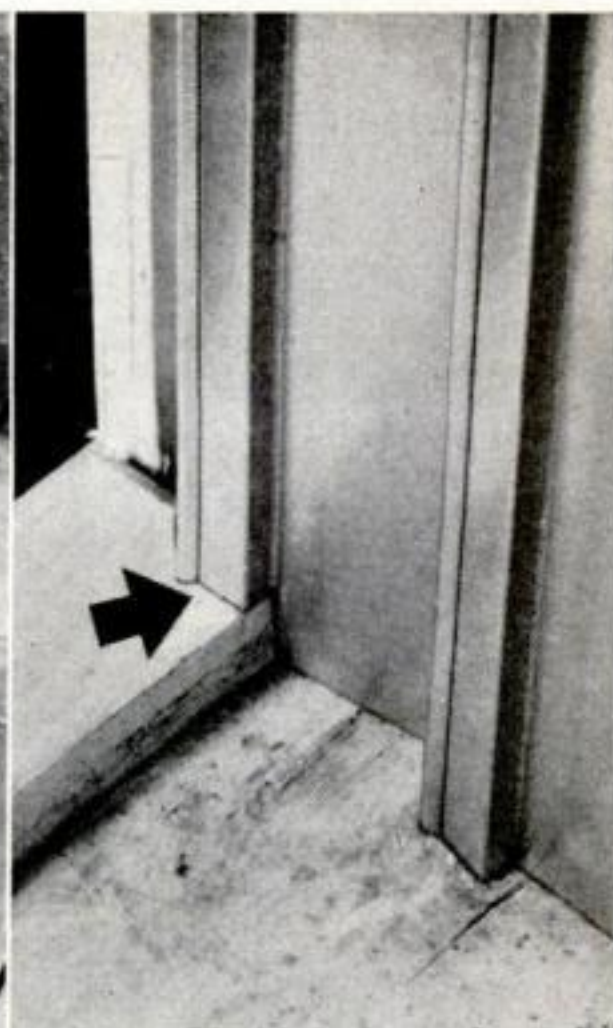




**4 MAKE TEMPLATE** to mark strips for trimming by drawing compass across vertical cardboard strip, with center point bearing on sill, as shown. Cut cardboard to line with shears.



**5 CUT ALONG GUIDE LINES** traced from template onto jamb strips. Use a fine (24-tooth) hacksaw blade. It's easiest to start cuts at the folded edges of the spring wedges, as above.

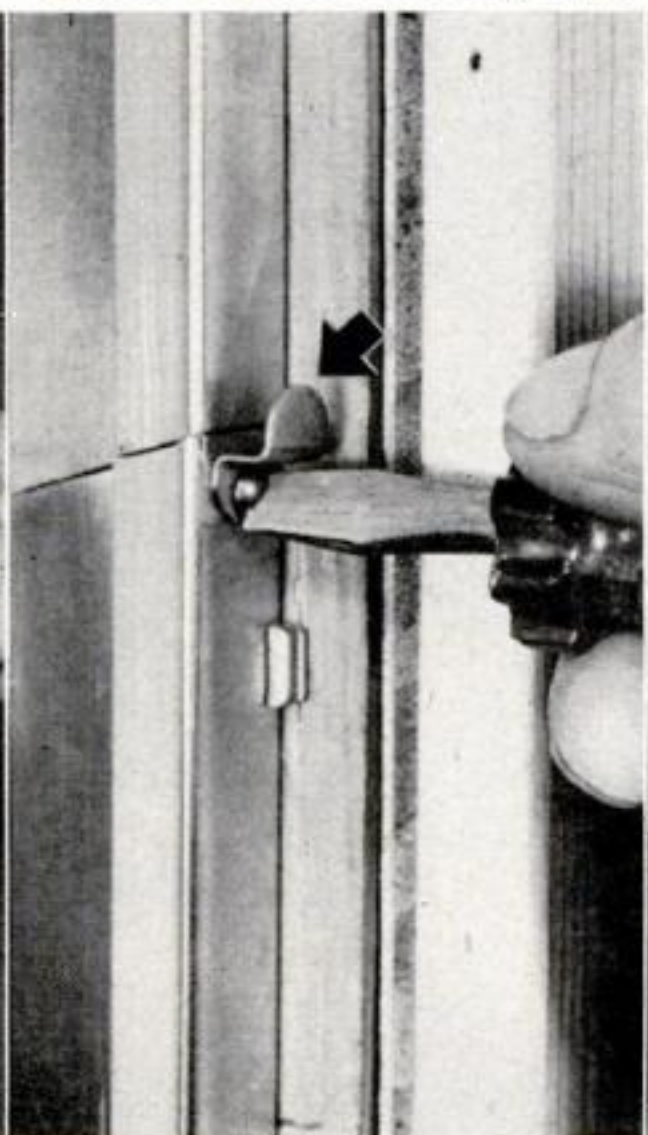


**6 SNUG FIT WITH SILL STOP** calls for notches at rear of inner jamb strips (indicated by arrow). The strips shown here were prenotched by the manufacturer (see photo of kit parts).

**10 TO CHECK FIT**, insert sash and slide to left, depressing left jamb. Then slip in removable right-hand jamb strips. If the sash moves too freely, ease off on jamb-strip screws.



**11 FASTEN LIFT-OVER KEY** to removable section of inner strip with sheet-metal screw supplied in kit. It's used to spring the strip out and over keeper tab when removing sash.



**12 NAIL WEATHER STRIPS** to top edge of upper sash, lower edge of bottom sash, and forward face of bottom rail on upper sash. Open edges of the V-shaped strips face out. **END**





**To get full value from shop equipment, remember this:**

# Any Power Tool Can Be a Sander

**By Edwin M. Love**

**P**OWER sanders can save hours of drudgery on finishing jobs. Yet many homeowners still write them off as luxury tools.

They needn't be. If you own a table, radial-, band-, or jig-saw; a lathe or drill press; an electric drill or a flexible shaft—you already have a potential, low-cost power sander.

All you need to put most of these tools

to work smoothing wood, plastics or soft metal is a circular plate to which sanding disks can be cemented or otherwise secured. In a few cases you may also need some kind of a supporting table to hold stock steady and aligned with the sanding plate.

While disk sanders will handle flat and convex surfaces, only one—a flexible type used with electric drills and flexible shafts—can reach into hollows for concave sanding. If you own a drill press, your best bet

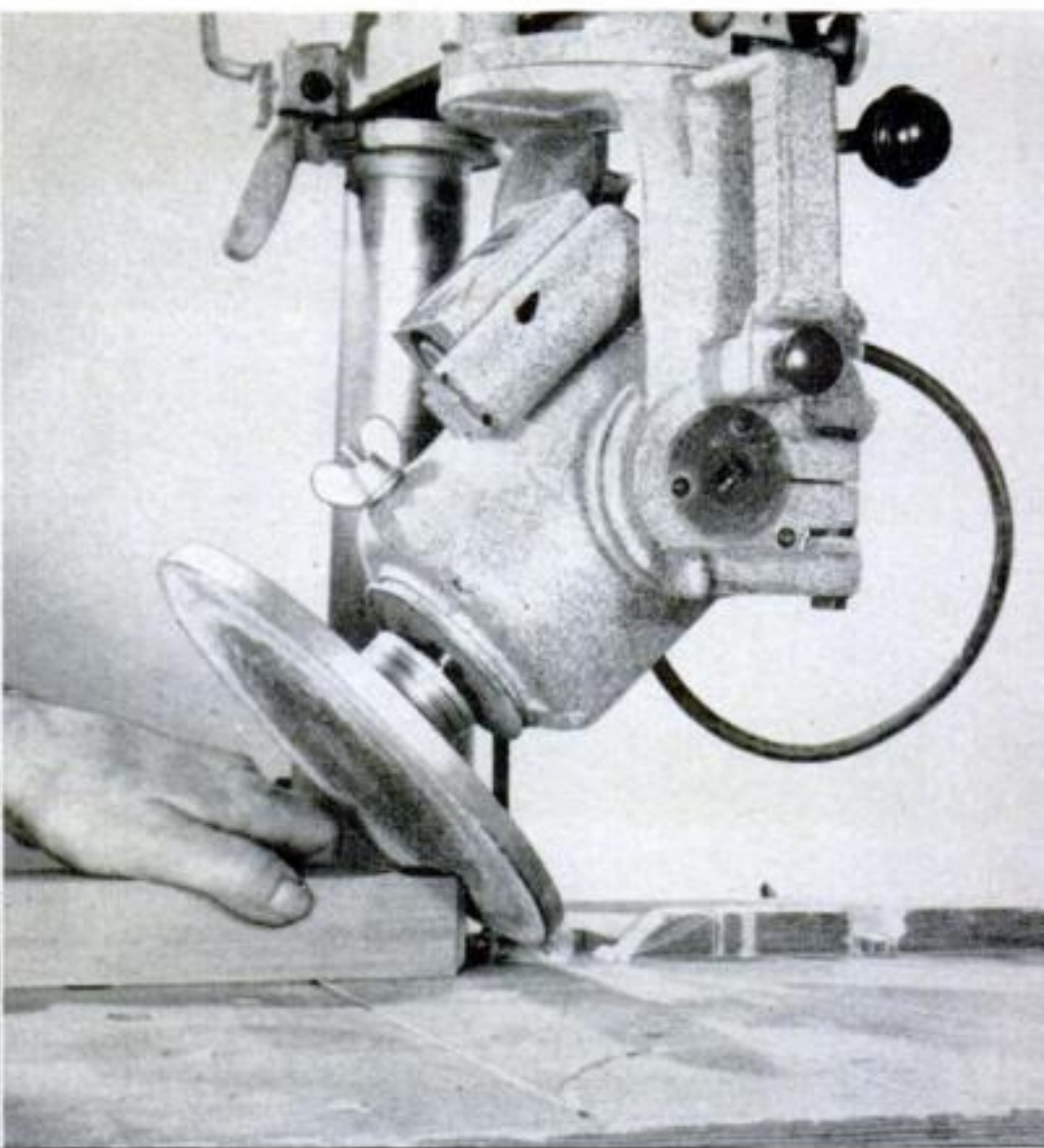
## FLEXIBLE SHAFT

brings sander to jobs too big to lift, as in the case of rounding off the edges of a workbench top. For a sure, safe grip, it's best to fasten a hand screw to the shaft handle, as shown below.



## RADIAL SAW

with a disk-sander attachment can be tilted in a jiffy to make neat chamfers and bevels. By sliding the stock along the saw fence to a stop block, chamfers are kept uniform.





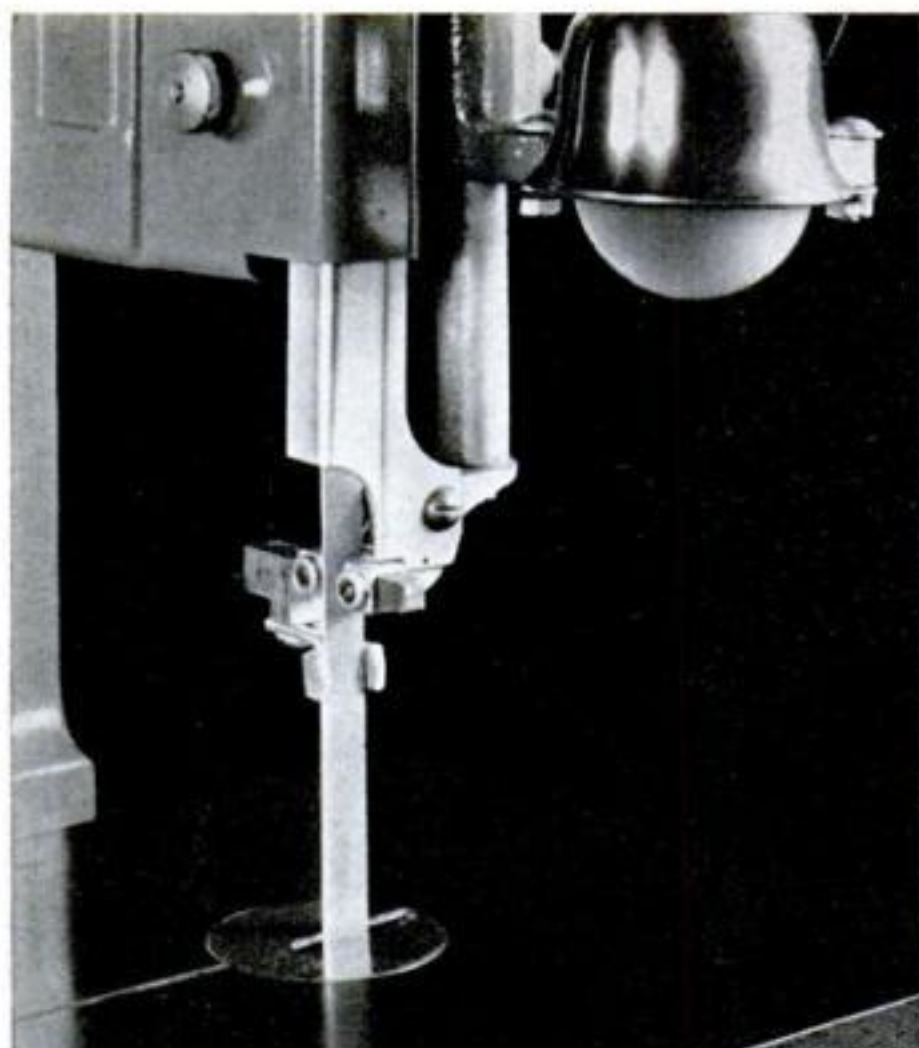


## TABLE SAW

makes a first-rate disk sander. You can even turn the plywood sanding plate on the saw arbor. Give one plate face a slight edge bevel (photo, right) before applying liquid adhesive. Use this face when jointing. Bevel admits the lead edge of work between plate and rip fence without scuffing off abrasive paper. Table or saw arbor may be tilted for bevel sanding.







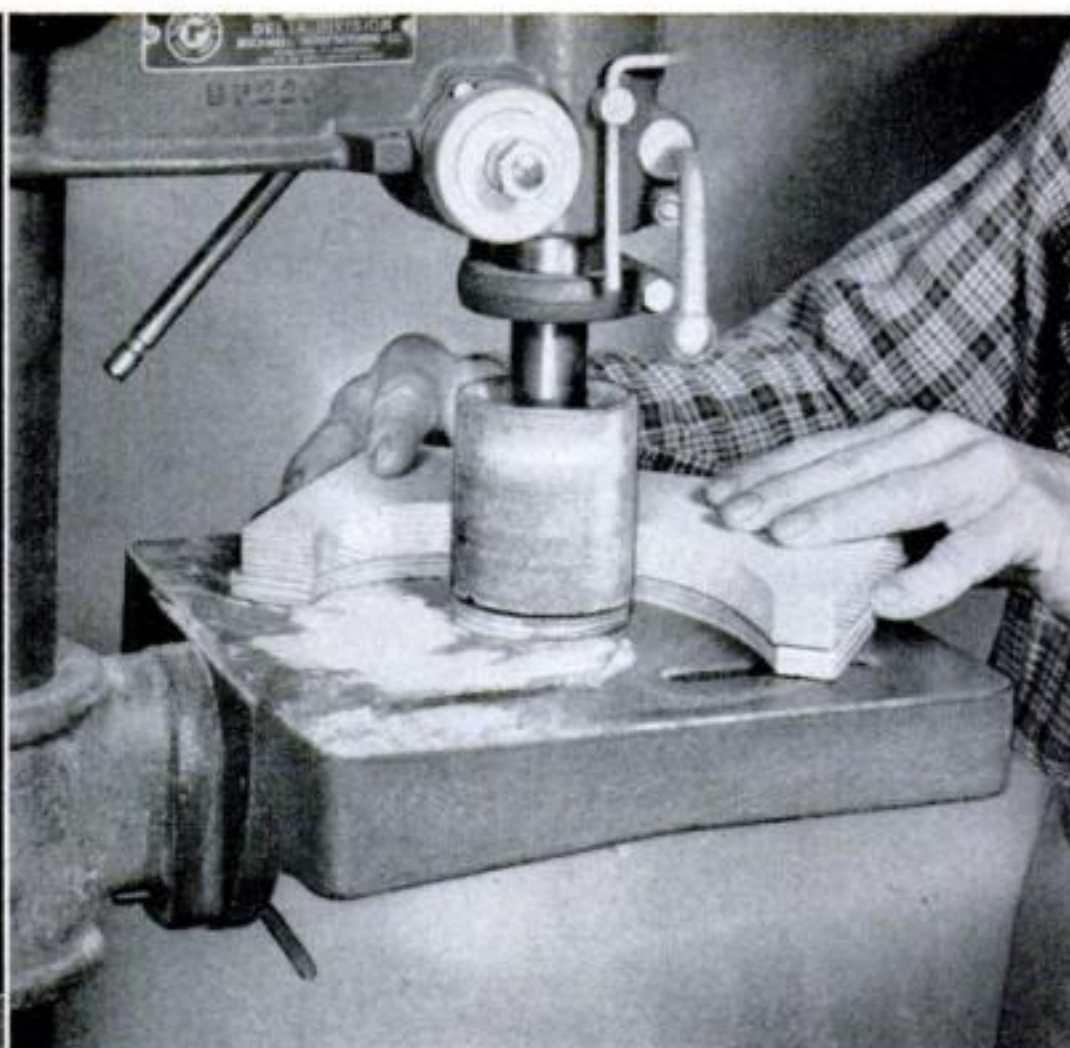
## BANDSAW

will handle convex, concave or straight-edge sanding with an abrasive belt that takes the place of the saw blade. Able to smooth any thickness of stock that the saw can cut, the belts come in fine, medium and coarse grits.

is a sanding drum. Made of rubber, its cylindrical core expands to grip an abrasive sleeve when a nut is tightened on its center spindle. Beside smoothing inside curves, a drum sander will do accurate straight-edge sanding when used with a fence. But the limited height of the drum makes it primarily an edge-sanding (not a face-sanding) tool.

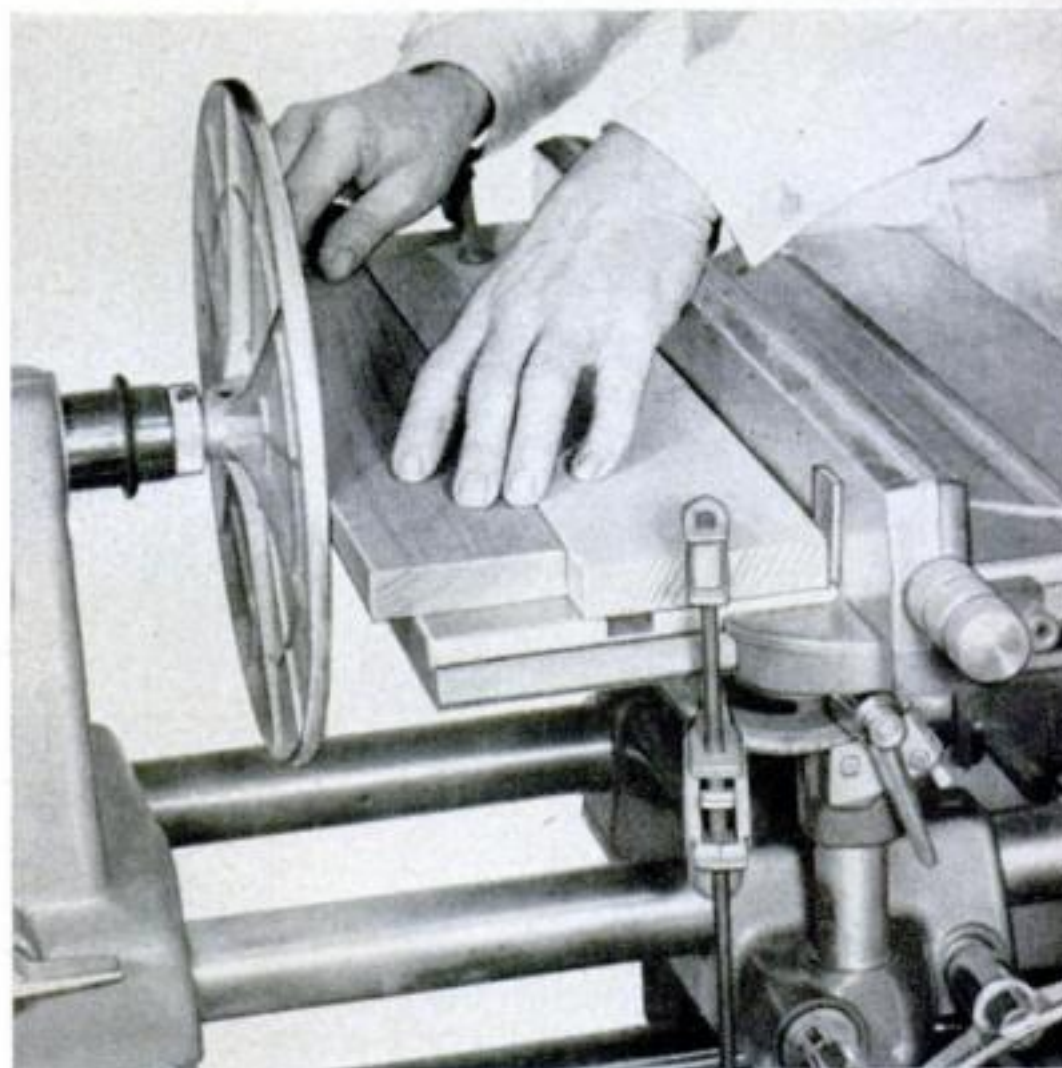
Own a jigsaw? Then don't overlook a handy little reciprocating sander attachment that will clean up scrollwork edges fast and accurately. With one flat and one half-round face, it works equally well on concave, convex and straight edges. Like a drum sander, it holds abrasive sleeves.

Whatever type of power-sanding appliance you settle for, take it easy when you use it. Always apply light pressure to avoid burning, removal of too much stock, or excessive abrasive-paper wear. And when you're smoothing a large surface with a disk sander, remember that the outer portion of the disk is moving faster than the center. This results in an uneven surface unless either the disk or the work is moved about to equalize the sanding action.



## DRILL PRESS

with sanding-drum attachment smooths concave edges. As shown, a plywood template is attached to the underside of the roughed-out stock, controlling sanding as it is pushed along a guiding disk bolted under the drum.



## ALL-PURPOSE POWER TOOLS

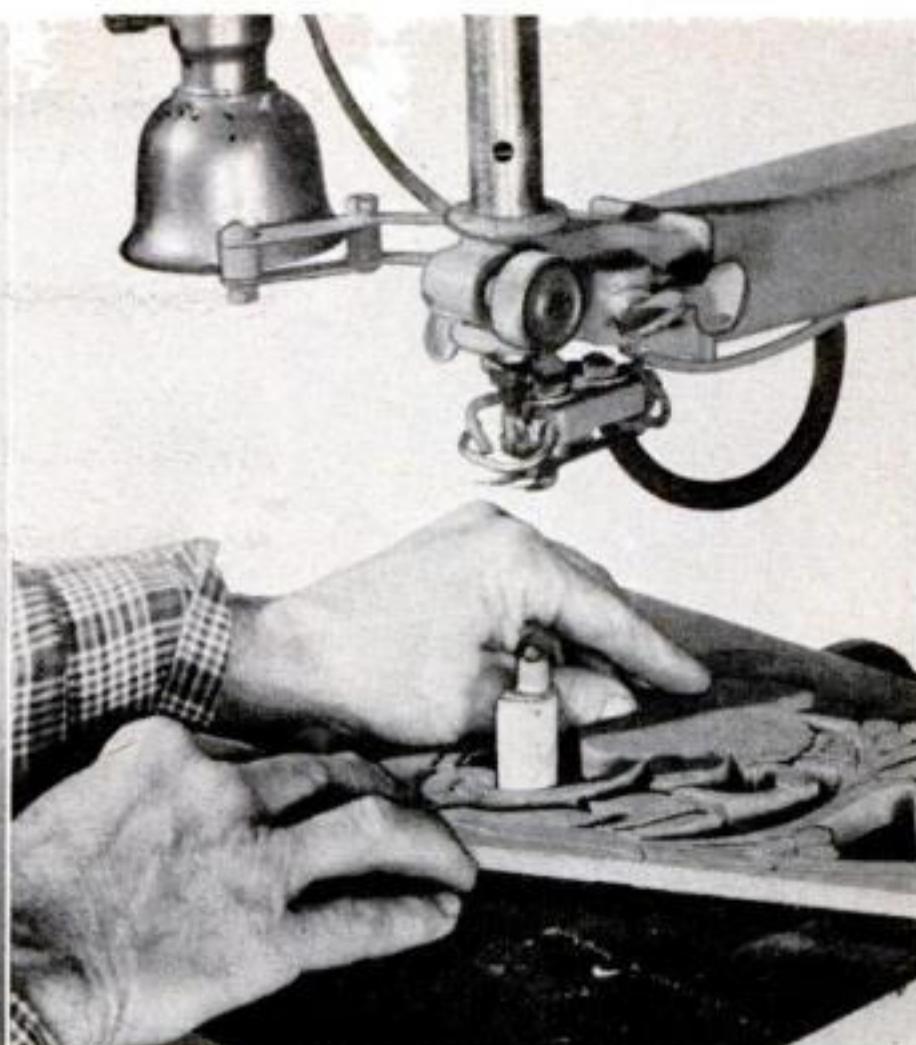
come with disk-sander attachments. In the jointing setup shown above, an auxiliary wood fence is shimmed and clamped at a slight angle to a flat-faced sanding plate. The stock fits freely between them at the start of the pass; it leaves narrowed to the desired width.





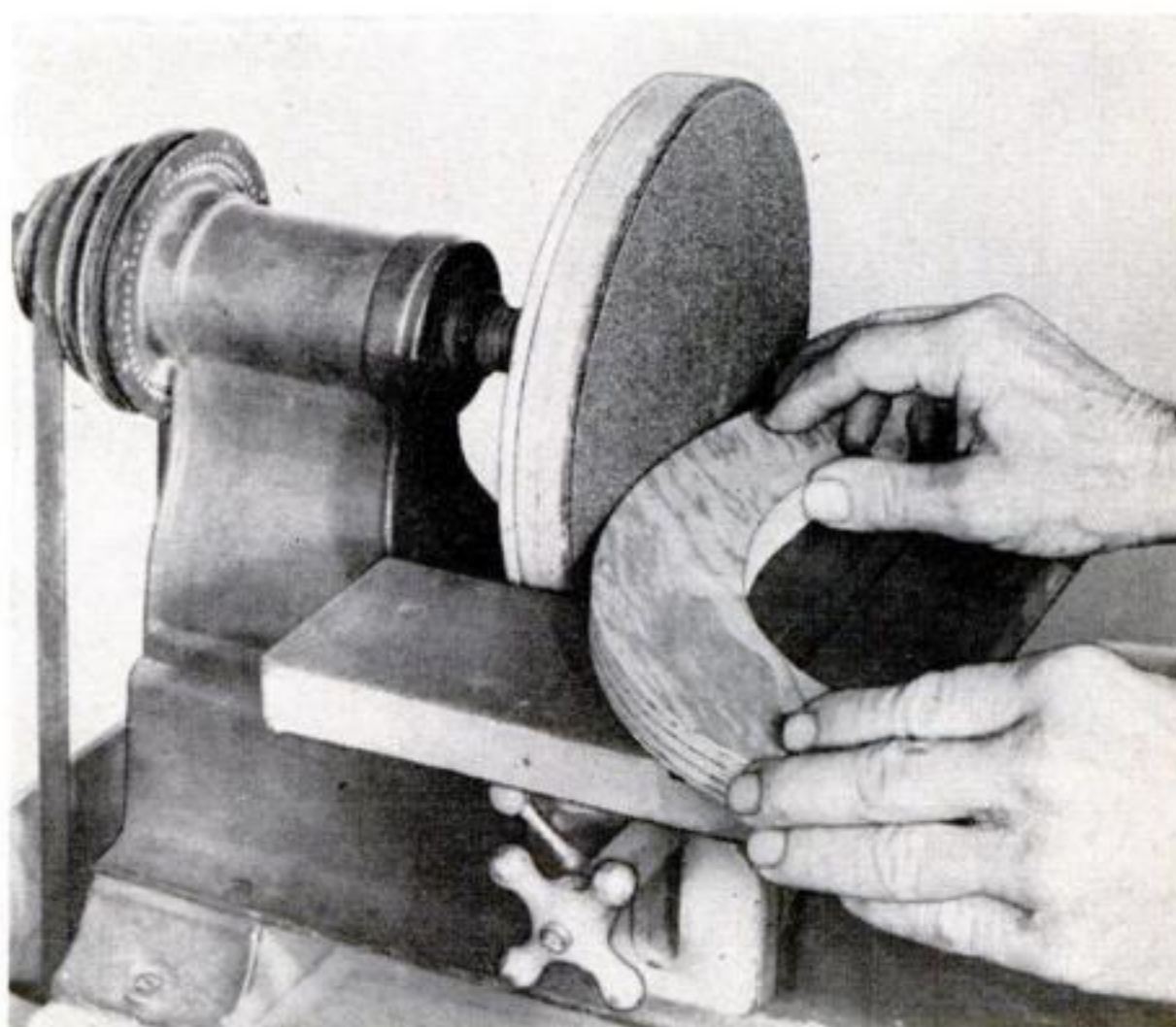
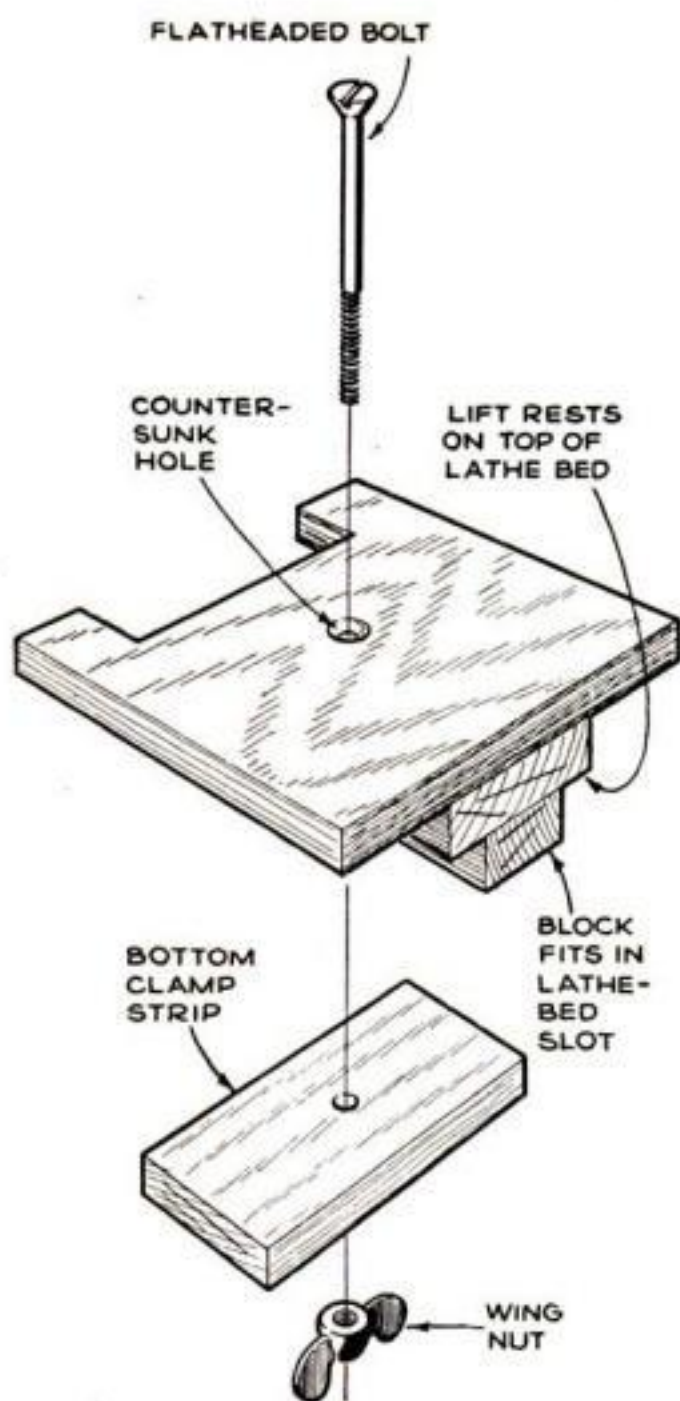
## ELECTRIC DRILL

becomes a concave-surface finisher with inexpensive, flexible-rubber sanding plate clamped in its chuck. The abrasive disk is attached by slipping a setscrew through its center and threading it into the hub of the plate.



## JIGSAW

offers a reciprocating sander with flat and half-round faces for smoothing fine fretwork. Attachment is fastened in the saw like a saber blade. Turning the knurled cap spreads the core halves to grip the abrasive sleeve.



## WOOD LATHE

becomes a disk sander when you attach an auxiliary table to the bed and a plywood sanding plate to the lathe's faceplate. Some lathe manufacturers offer tables that can be raised or lowered and tilted. For most sanding jobs, however, you can use a simple assembly made from scrap wood, like the one shown in the drawing. Make sure the table top is at a 90° angle to the disk. **END**



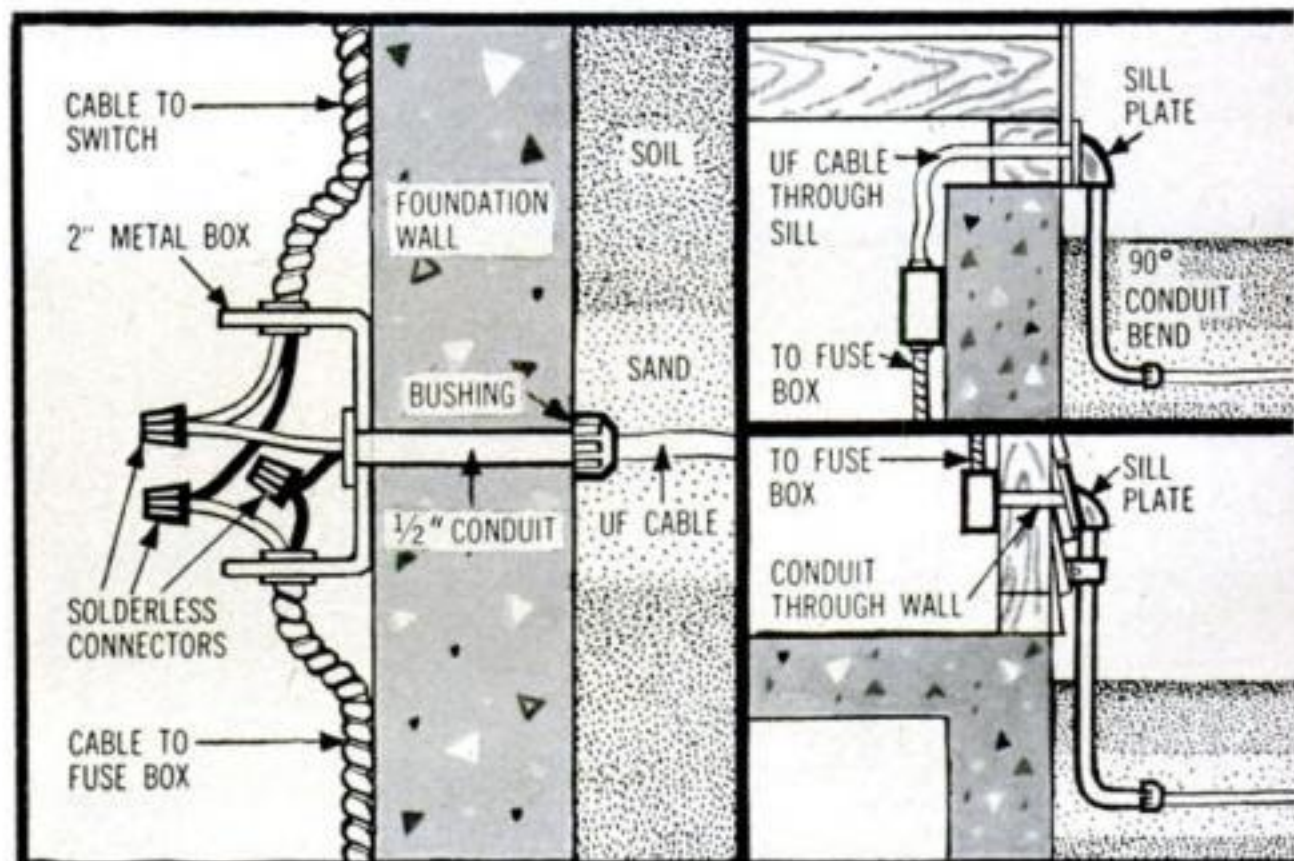
# How to Install

**W**HAT are the code requirements for running electricity to the back of your lot? How do you get power out of the house? How do you wire floodlights and exterior outlets?

**By  
Darrell  
Huff**

For appearance, you'll probably want all wires underground. You can do this with lead-covered cable or the newer plastic-covered UF (underground feeder). Both are used the same way, but lead-covered cable is a little more expensive and not as easy to work with. Some communities require it.

**Coming out of the house . . . . .**



**TO BRING ELECTRICITY THROUGH WALL,** junction box is mounted on inside of foundation and attached to conduit. Box is needed to permit joining regular house wiring to special underground cable. If foundation is hard to get through, cable can be run through sill (upper right). If there's no cellar, cable can be run through conduit in house wall (lower right).



# Outdoor Wiring

UF cable comes with one, two or three conductors sealed in neoprene. It can be buried in the ground without special protection. It can be imbedded in plaster or concrete.

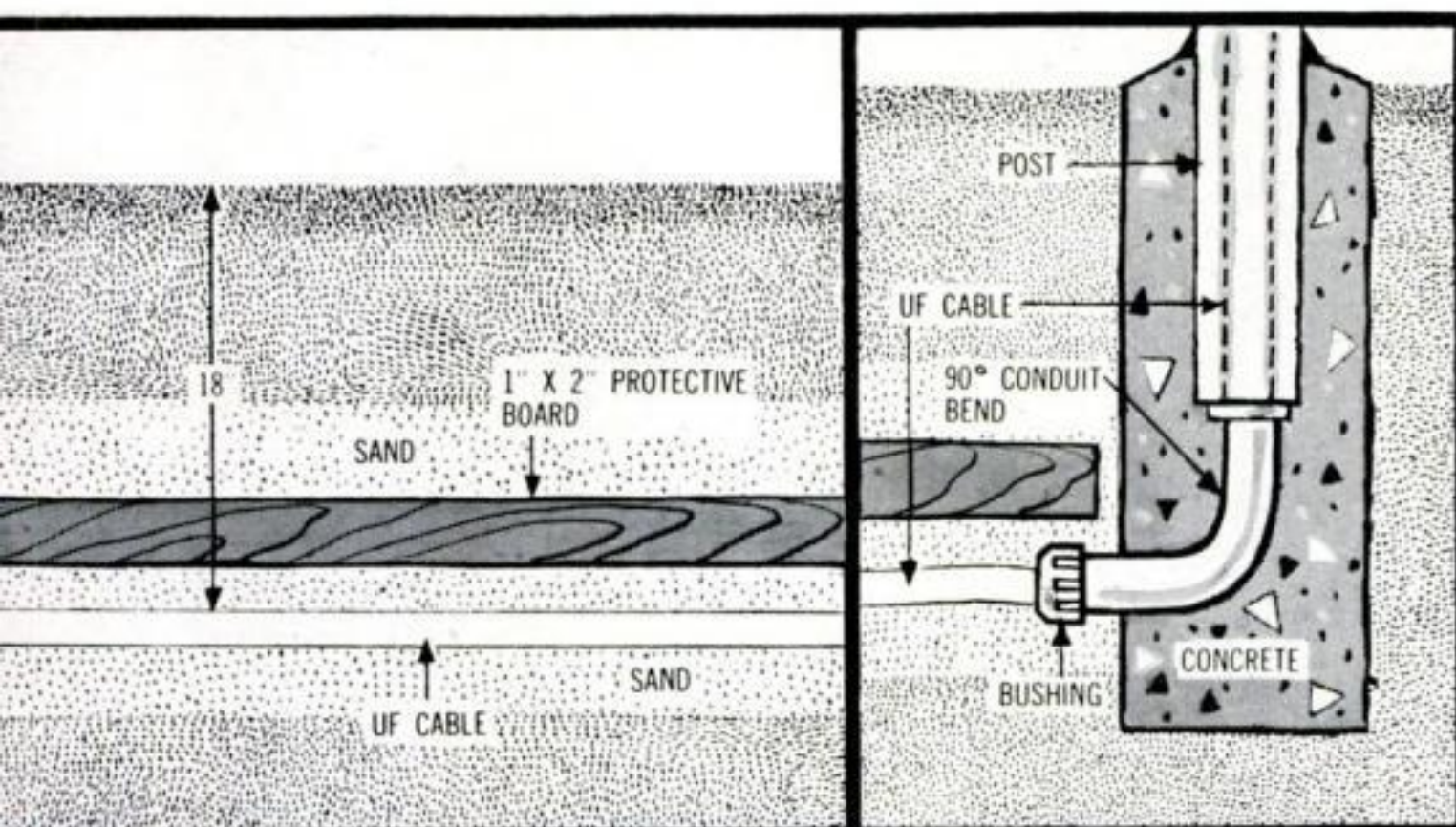
The most common two-conductor UF cable costs eight to 10 cents a foot. No. 14 wire will handle 15-amp circuits and distances up to 100 feet; for longer runs or 20-amp circuits, the larger No. 12 is required.

Unless local codes specify otherwise, UF cable needs to be run through metal

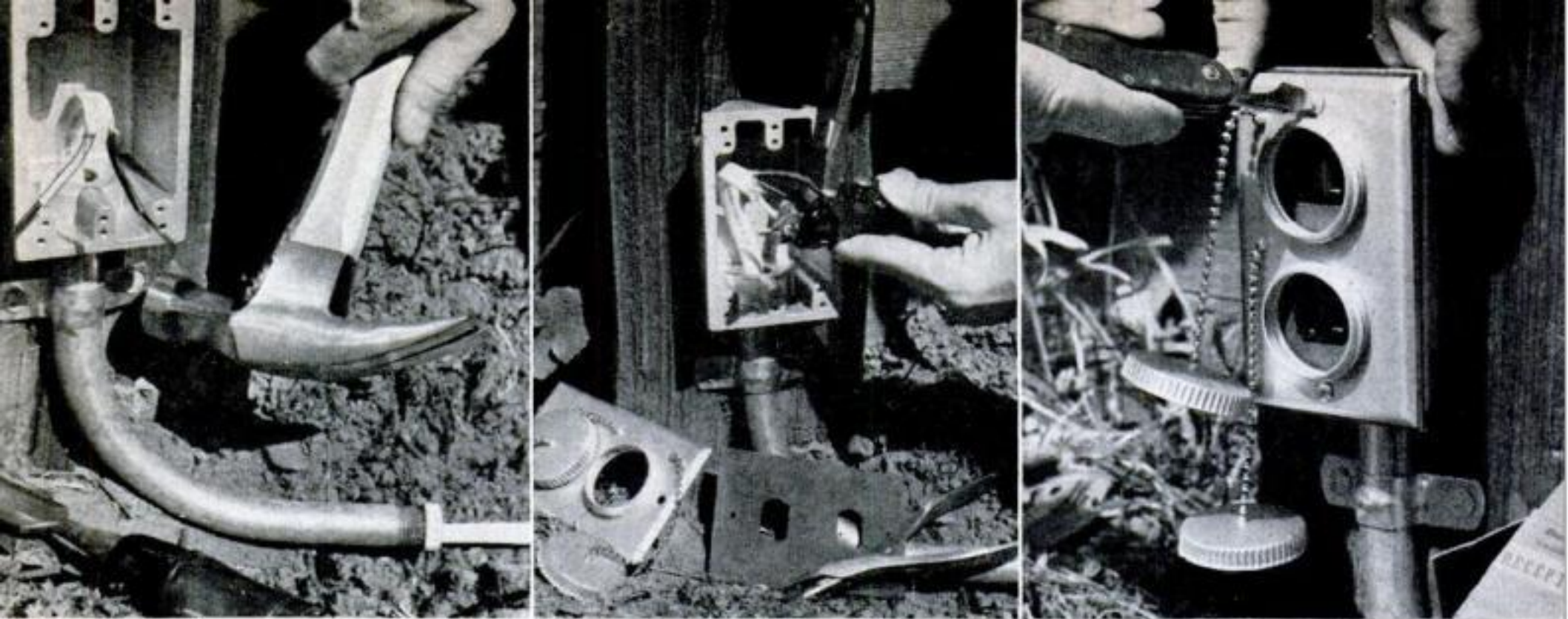
conduit only where it enters or leaves the ground. For this, curved sections of conduit, called "bends," carry the UF cable into the ground at the house, and out again wherever you want a yard light or outlet. (The sections can also be bought threaded at the ends for connection to threaded outdoor fixtures.)

For an underground run, the cable is buried in a narrow trench about 18" deep. Lay 1"-by-2" strips of wood over it to keep it from being struck by a shovel or other sharp tool. And in rocky soil,

*... going underground ..... and up again*







## How a power outlet is installed in the yard

**WEATHERPROOF BOX** is screwed to conduit that carries cable up from ground. While box can stand by itself, it's best to fasten it to a fence, post or tree to prevent tripping over it.

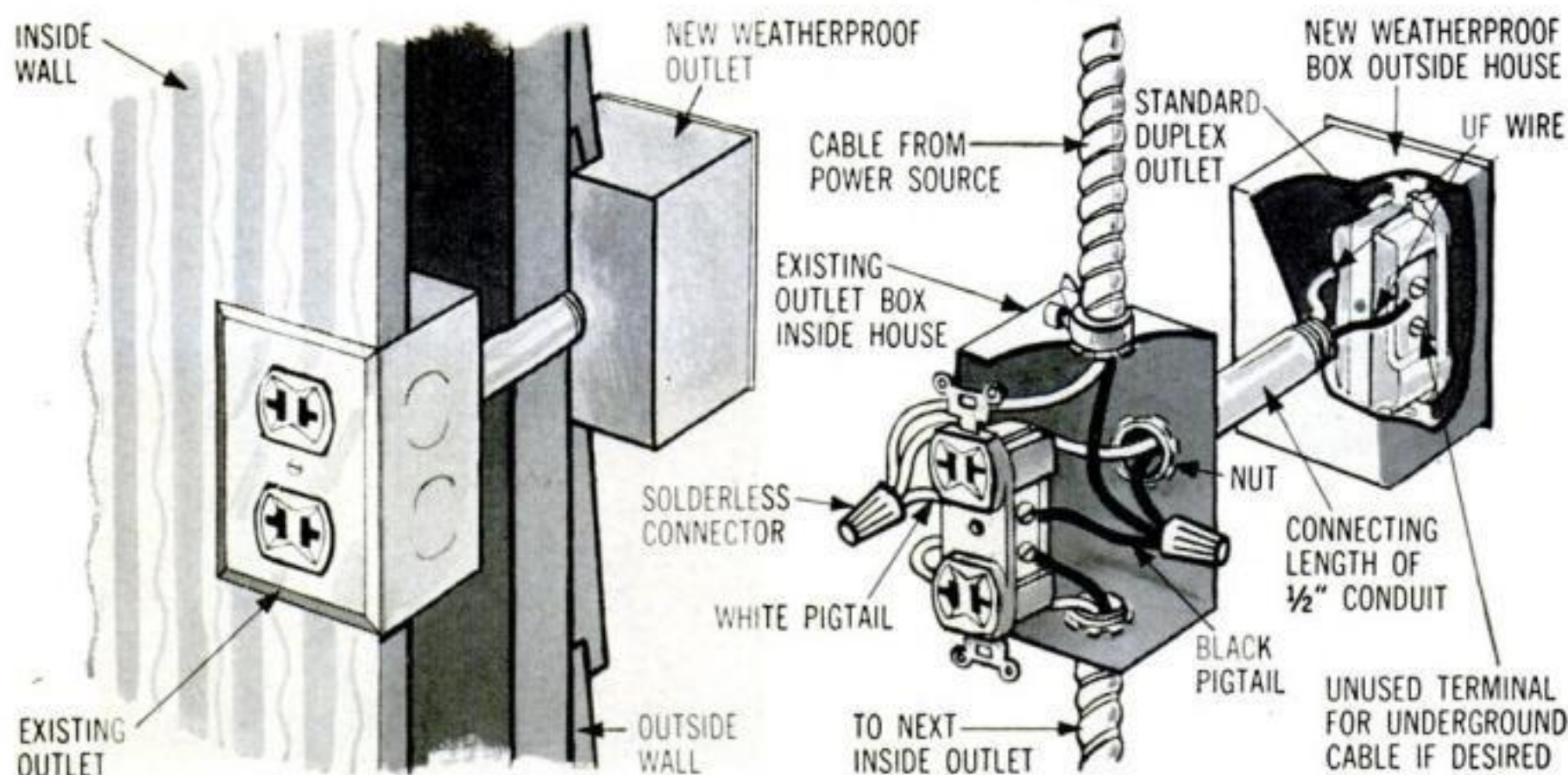
**WIRES ARE EXPOSED** by splitting cable 2" to 3" down middle and peeling off plastic sheath. Black wire is then connected to brass screw on the outlet and white wire to the nickel screw.

**WATERTIGHT GASKET** fits over standard indoor duplex outlet. Metal cover plate is then screwed to the box. Keep the box closed with screw caps in rain and whenever it's not being used.

better surround it with a few inches of sand to prevent abrasion.

**Weatherproof wire.** Suppose you have to cross a paved driveway or other obstacle you can't burrow under? A solution is stringing weatherproof wire, a black, single-conductor type for overhead use only. It is designated as WP, RW and TW.

You should also know about a heavy-duty, rubber-covered cable for outdoor use on portable fixtures and as temporary extension cords. This comes in many similar-looking types, not all of them suitable for outdoors. The following types are recommended: S, SJ, ST, SJT, SO and SJO. Special weatherproof plugs and sockets are used with them.



## You can add an outlet on the house without going underground

**CONNECTING OUTDOOR OUTLET** to existing inside outlet is one way to get power without installing a new circuit. Wires are disconnected so that inside receptacle can be taken out. Then knock-out disk is removed from back of box and a  $\frac{7}{8}$ " or 1" hole is drilled through outer wall. If

four wires go to existing outlet, new wires must be connected by means of "pigtails," as shown above, since codes do not permit fastening more than one wire to each terminal. If there are spare terminals on the inside outlet, the new wires can go directly to these.



**Where to get the power.** You have two choices. An outdoor cable can be run from an existing circuit in the house; or a new, separate circuit can be installed at the fuse box.

Tapping into an existing circuit is the simplest way provided it isn't already fully loaded. One method is to mount a weatherproof outlet box on the outside of the house directly opposite an existing outlet box on the inside wall. UF cable is then fed from the inner box to the outer one through a short length of conduit.

Another method: Find a junction box (or a cellar light fixture mounted on a junction box). A new cable can be connected into this box in the usual way—white wire to white, black to black—after the power has been turned off.

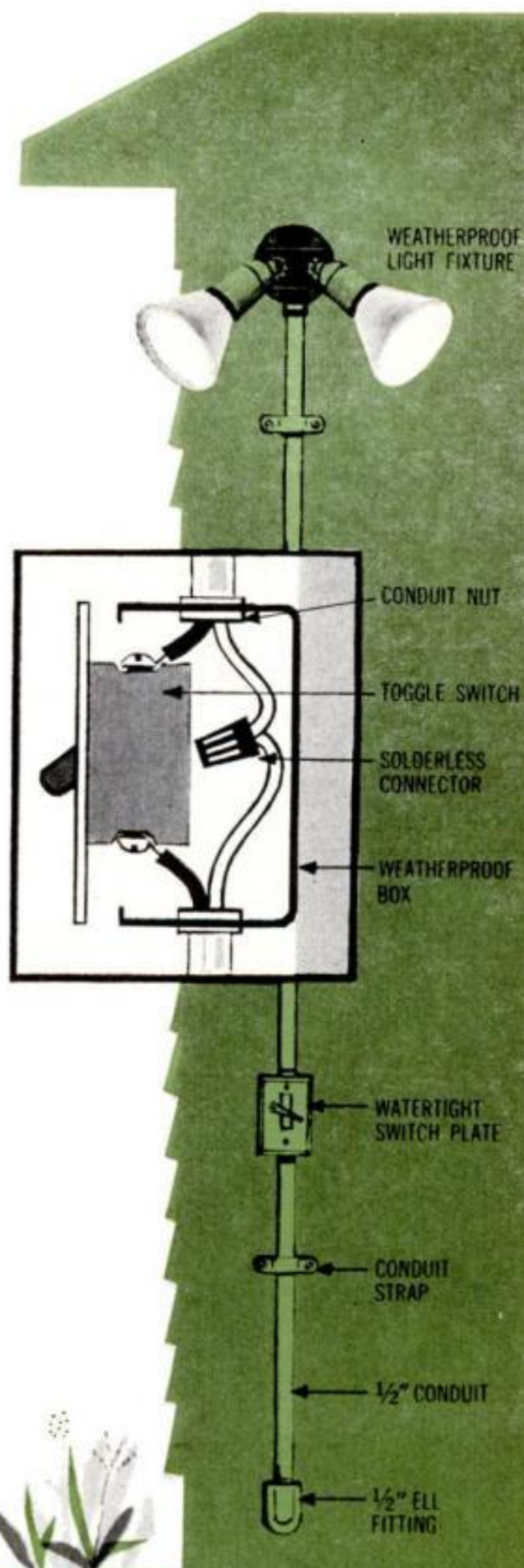
This cable should be the same type as the rest of your inside wiring—usually BX or Romex. It's run from the existing box to a new box mounted on the inside wall, then is spliced to the UF cable that actually goes out through the wall.

**Adding a new circuit.** This is the answer if an existing one isn't easy to get at or can't provide the power you need.

An unused circuit may already be available at your fuse box or circuit breaker. If not, an electrician can install an extra two-circuit fuse box. If your code permits, a continuous length of UF cable can be run directly from the box to the outdoors, which makes the job easier.

The neatest way to lead wire outdoors is right through the house foundation—underground so that no wires show from the outside.

The UF cable is fed through the wall inside a short length of  $\frac{1}{2}$ " rigid conduit ( $\frac{13}{16}$ " outside diameter), bought threaded at the ends. For this, a  $\frac{7}{8}$ " or 1" hole can be drilled through the concrete with a



### How to wire a switch to control a light

**STANDARD TOGGLE SWITCH** fits in same type of weatherproof box as outlet. Box is screwed between two lengths of  $\frac{1}{2}$ " conduit at convenient height, then conduit is stapled to house. Black UF leads go to terminals on switch; white leads are spliced. Threaded outdoor light fixture

screws to threaded conduit. An ell fitting joins conduit's lower end to conduit that comes through house wall. Or a switch box could be mounted in place of the ell to control either the light on the house or a separate yard light where the cable runs underground.



star drill or a masonry bit in a power drill.

The inner end of the conduit is fastened to the back of a standard junction box with a nut, which also holds the box in place. The outer end of the conduit is locked in place with a  $\frac{1}{2}$ " screw-on bushing; it gives a smooth edge where the UF cable comes out.

**Bringing the cable out.** The cable must exit aboveground if you have a slab foundation or if you want an outlet on the outside of the house wall. Here the junction box on the inside is connected by conduit to a special weatherproof outlet box on the outside wall. The conduit screws into the back of the box, requiring no nut.

Extra capped holes are also provided in the ends of weatherproof outlets. These can be used if you want to run additional cables into the ground or up the house.

If you don't need an outlet on the house, a conduit "ell" or "sill plate" can be substituted for the weatherproof box. An ell is a right-angle coupling that leads the conduit from the house into the ground. A sill plate is similar, but can be bought with an angled face plate that matches the slope of shingles or clapboards.

**Making connections.** Outdoor outlets are wired the same way as the indoor

kind—in fact, the receptacles themselves are identical. A standard toggle switch can also be mounted in a weatherproof box, with a special cover plate arranged to operate the toggle.

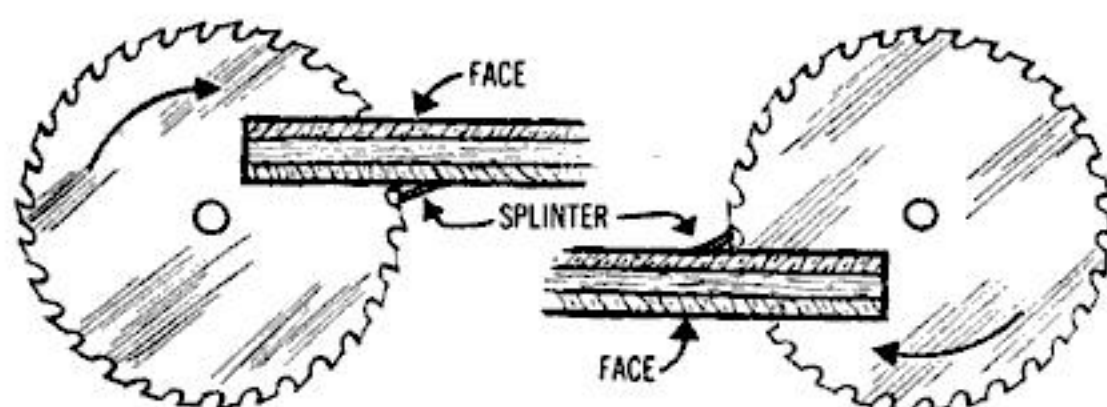
Switches and outlets can be inserted, or cables spliced, wherever the line runs aboveground, provided all connections are made in sealed boxes; no exposed connections are permitted. Once underground, however, UF cable cannot be cut and spliced *even inside a box*. This means that the exact length of cable needed must be carefully measured first.

Aboveground, it's best to enclose UF cable in conduit for all vertical runs, such as up the side of the house. Under roof eaves and in other protected places, the cable can be fastened directly to wood or masonry with plastic-cable straps.

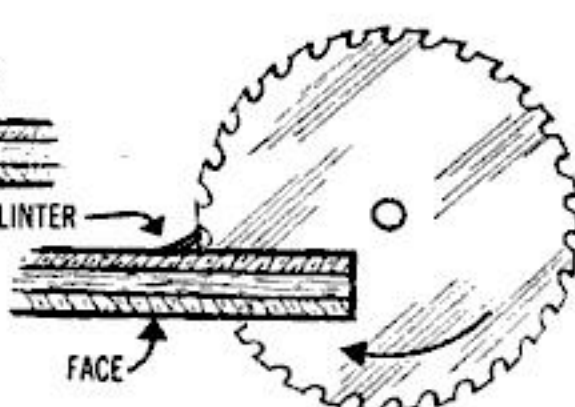
**Must wires be grounded?** Not for permanently wired lights or for outlets used only with portable lights. But where power tools or other machinery are to be used, receptacles should be of the three-slot grounded type.

These are wired with grounded UF cable, which has an extra wire that goes to a special grounding screw on the receptacle. At the house end, the ground wire is connected to the metallic sheath on BX cable or to the ground wire provided in Romex cable. END

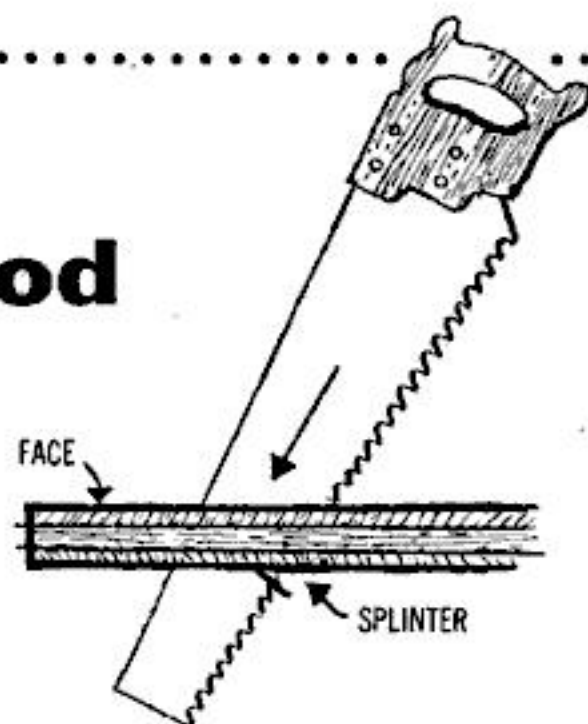
## The Right Way to Saw Plywood



**CIRCULAR SAW**  
(GUIDE MARKS ON FACE)



**PORTABLE SAW**  
(GUIDE MARKS ON BACK)



**HANDSAW**  
(GUIDE MARKS ON FACE)

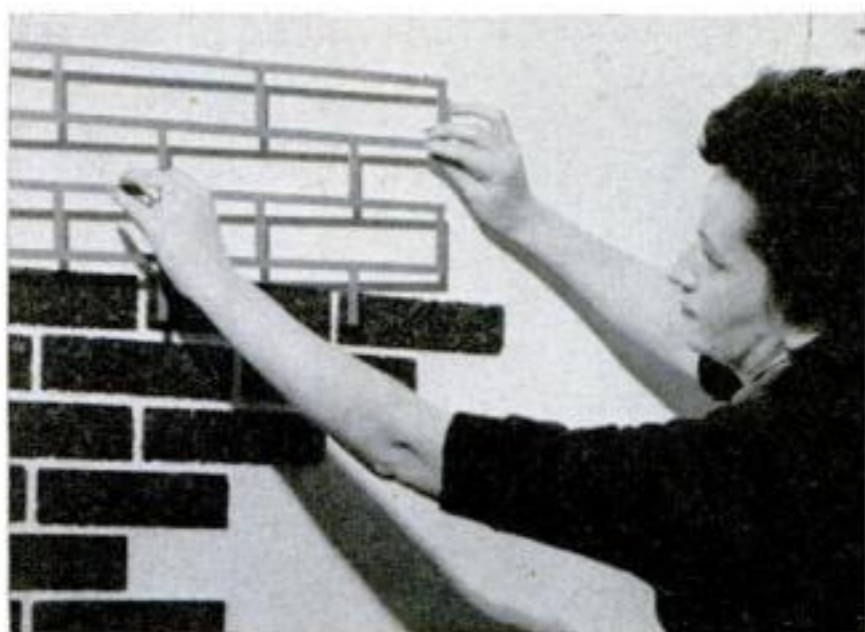
**S**AWS roughen up the edges of plywood on the side where the teeth break through on the cutting stroke. By allowing for this when marking and cutting panels, the splintering can be confined to the back or unexposed edges of parts. Handsaws, circular saws, jigsaws and

bandsaws cut downward. So the plywood should be marked and sawed with the finished face upward. But place the plywood face downward when you're working with a portable power saw or portable jigsaw, both of which cut on the upstroke. —C. C. Cooley, New Buffalo, Mich.

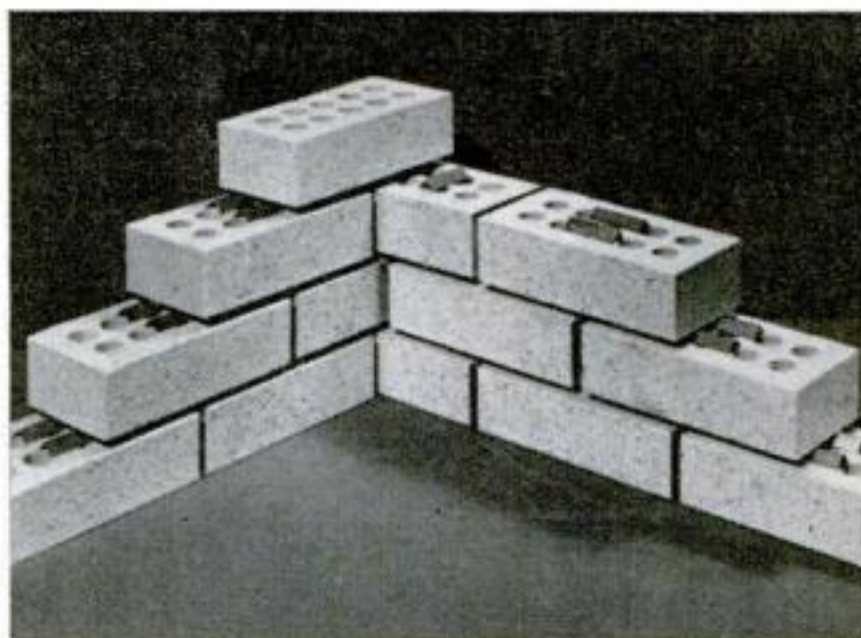


# New for the Handyman

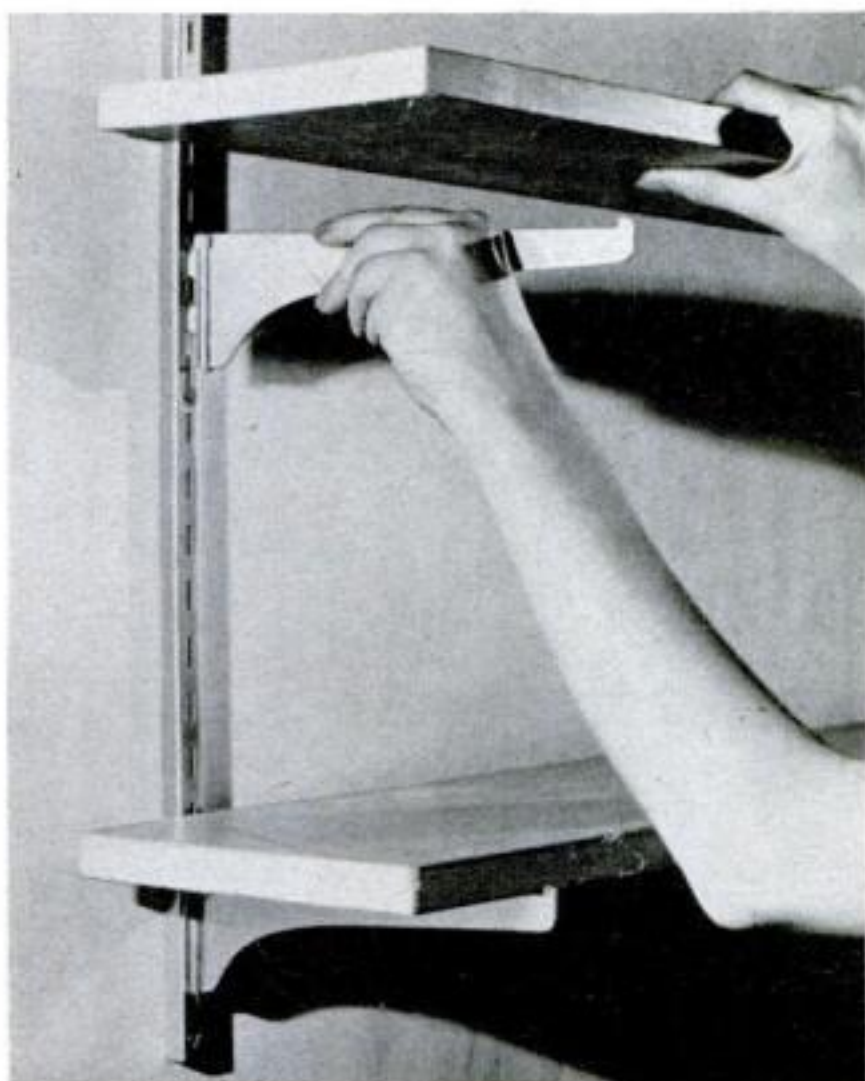
.....



**1. Template Aligns "Bricks."** This imitation brick goes up on a wall one piece at a time, like tiles. Each rectangle is set in a guide plate so that you don't have to fuss with a level line. For use over wood, paint or plaster, the cork material acts as wall insulation, too.



**2. Self-Leveling Spacers.** Steel angles make it easy for an amateur to lay up tile, cement block or brick with uniform  $\frac{3}{8}$ -inch mortar joints. Two spacers per tile are set in the mortar, point up. Then the tile is pressed down and excess mortar is squeezed out and troweled off.



**3. Rack Adds Gleam of Brass.** Boltless brackets fasten to wall strips with a friction grip to hold boards or other shelving firmly. Inch-apart slots in the strips make the brackets adjustable. Brackets and vertical standards are now available in brass plate, in addition to steel.

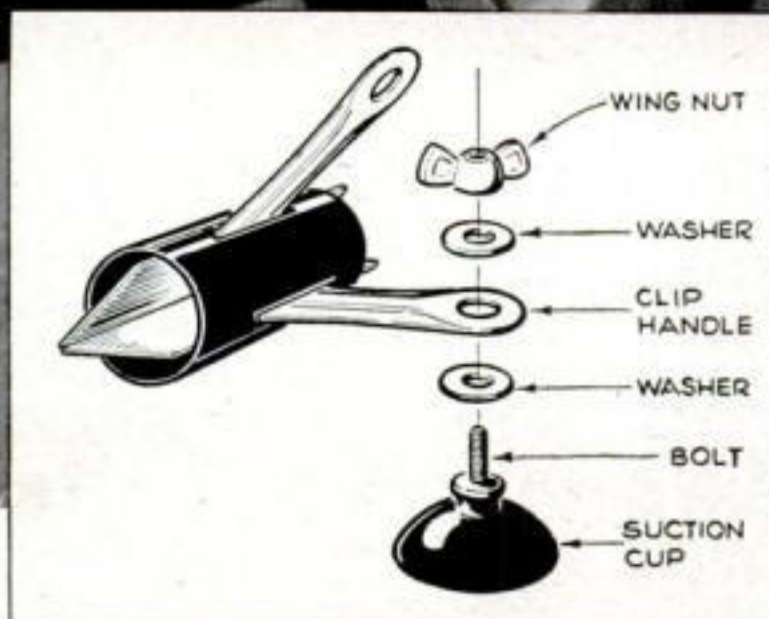


**4. Cut-It-Yourself Filter.** A new glass-fiber pad, a big 16" by 24" in size, will let you fit a filter to any size home air conditioner. A half-inch thick to trap a maximum of dust, dirt and pollen, it is fire-resistant and moistureproof. It can be cut to size with scissors or a knife.

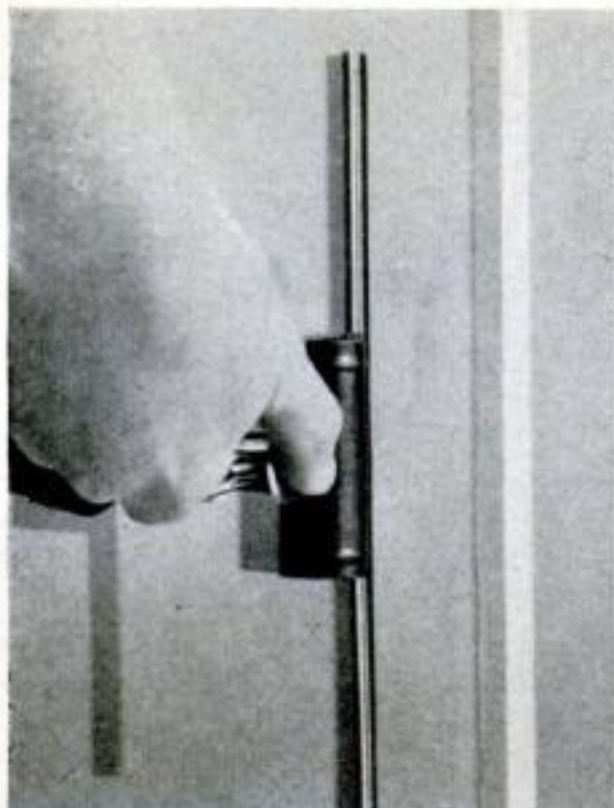
**More information** about these products can be obtained from: 1. Mastercraft Products, 212 Summer St., Boston 10; 2. Sigl Plumbing & Mfg. Co., 430 Delaware Ave., Buffalo 2; 3. Knape & Vogt Mfg. Co., Grand Rapids, Mich.; 4. Pittsburgh Plate Glass Co., Pittsburgh 22.



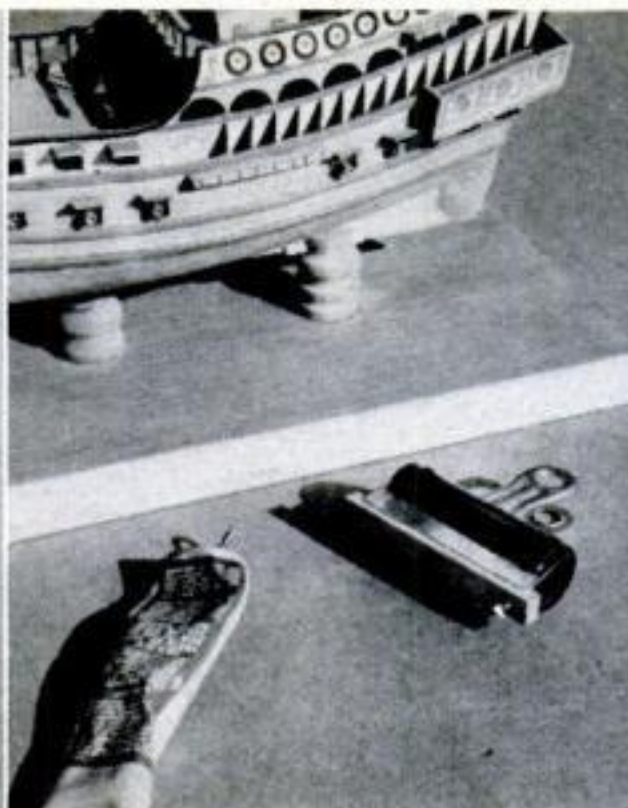
# 13 Off-Beat Uses for Spring Clips



**SOLDERING VISE** is made by attaching a clip to a pie tin with a suction cup (sketch at left). The tin catches messy solder drippings.



**MAKE A SQUEEGEE** from a windshield-wiper blade for cleaning windows. Clip forms a handle.

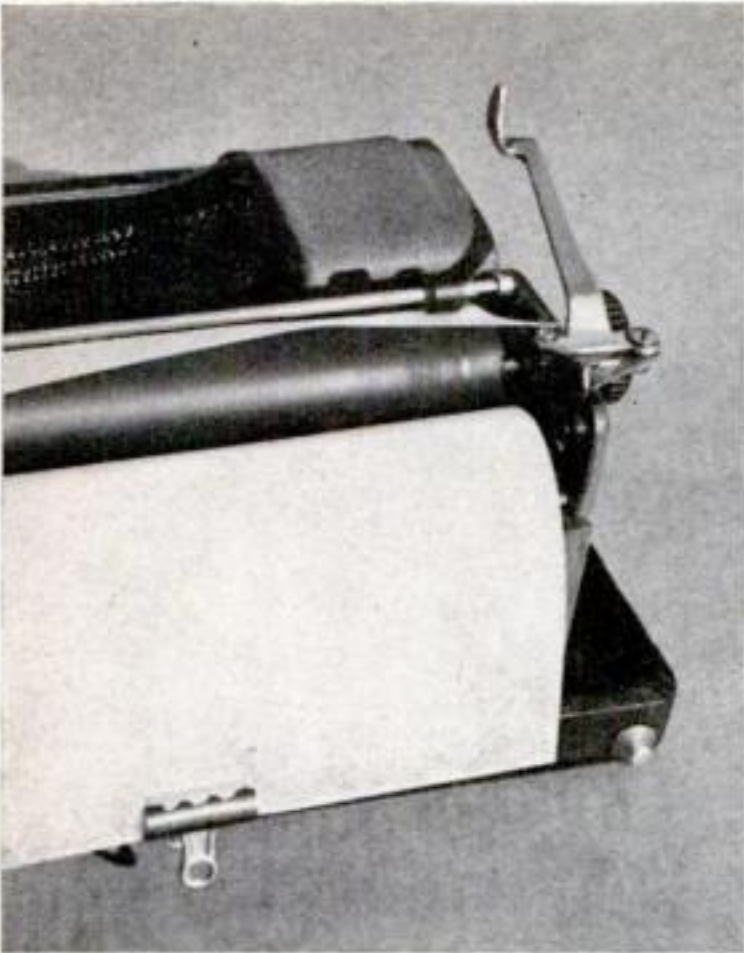


**APPLYING GLUE** to model parts is easier when you hold them securely with a spring clip.

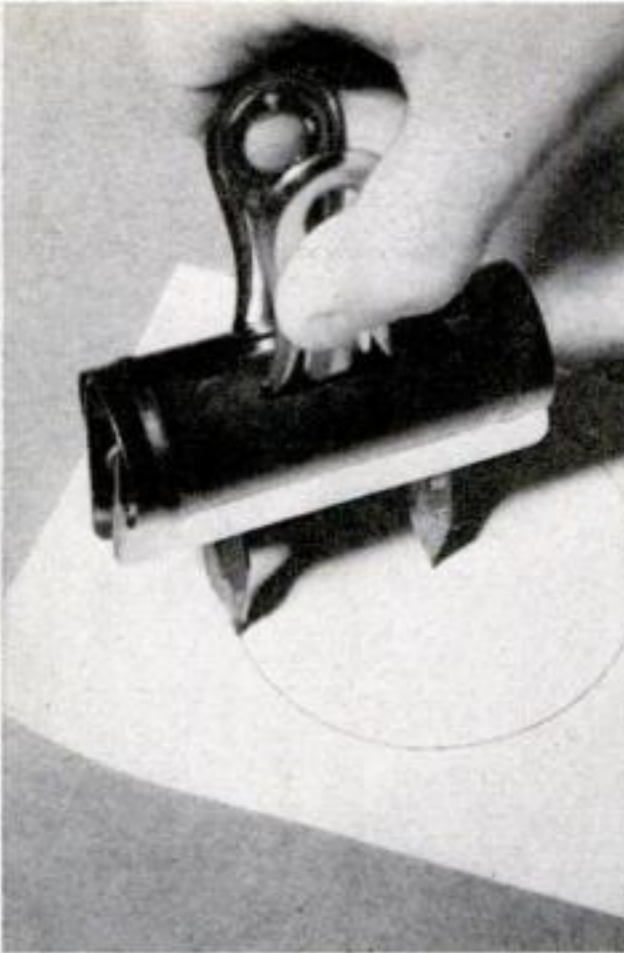


**SIGN HOLDER** for a store is made by bending the handles of a clip and inserting the sign.

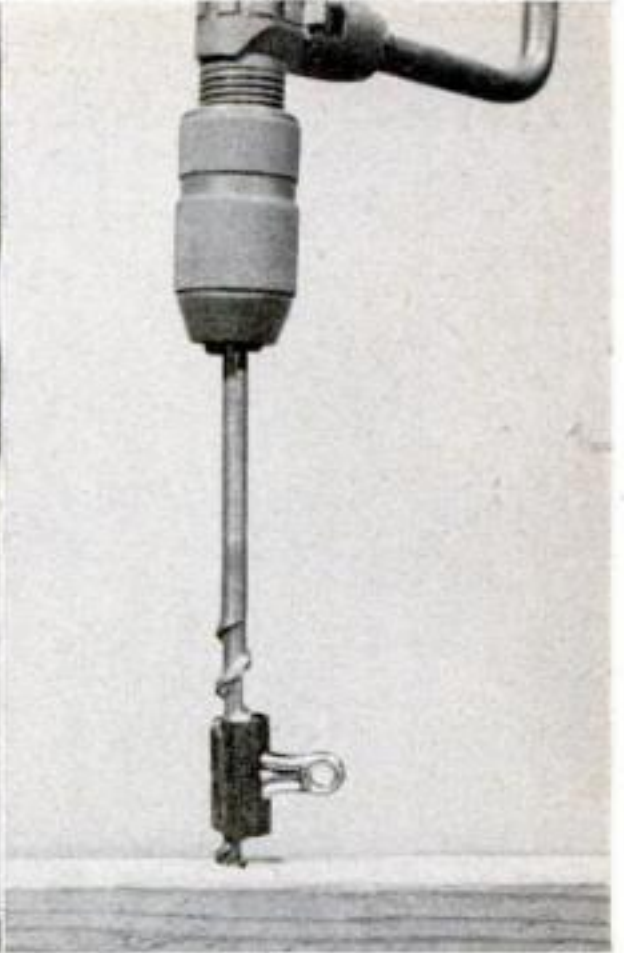




**USED AS A WEIGHT**, a clip ends the nuisance of paper blowing or curling up in the typist's way.



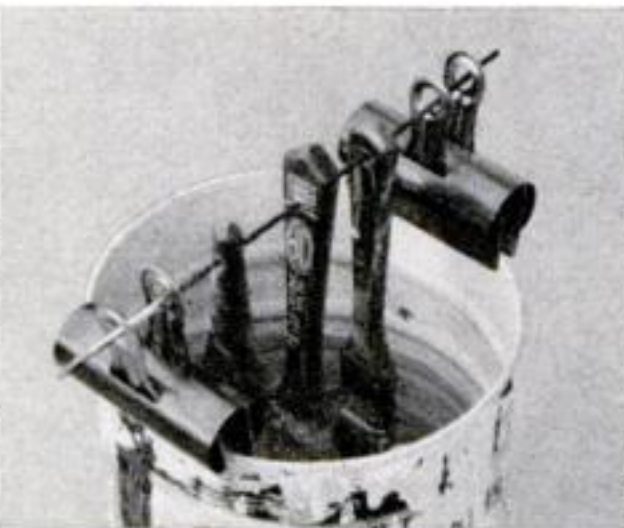
**EMERGENCY COMPASS** is made by holding two short pencils in position with a spring clip.



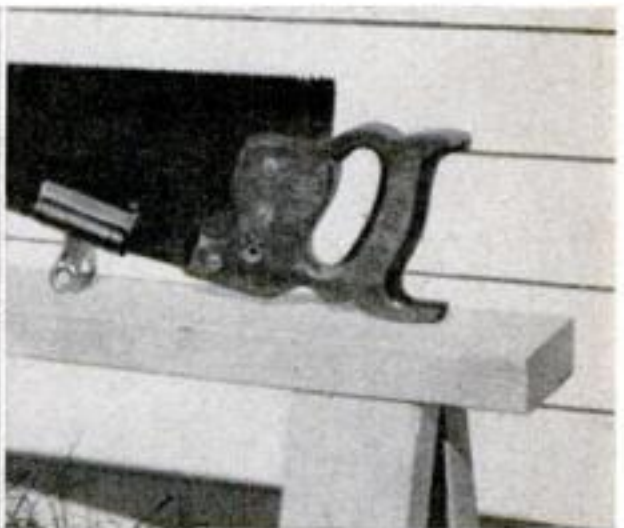
**DEPTH GAUGE** for your auger bit can be improvised by clamping a spring clip on it, like this.



**SOLDERING-IRON STAND** is a large clip with the handles bent outward slightly for stability.



**STRING PAINTBRUSHES** along clip-held rod to preserve bristles. They hang straight in solvent.



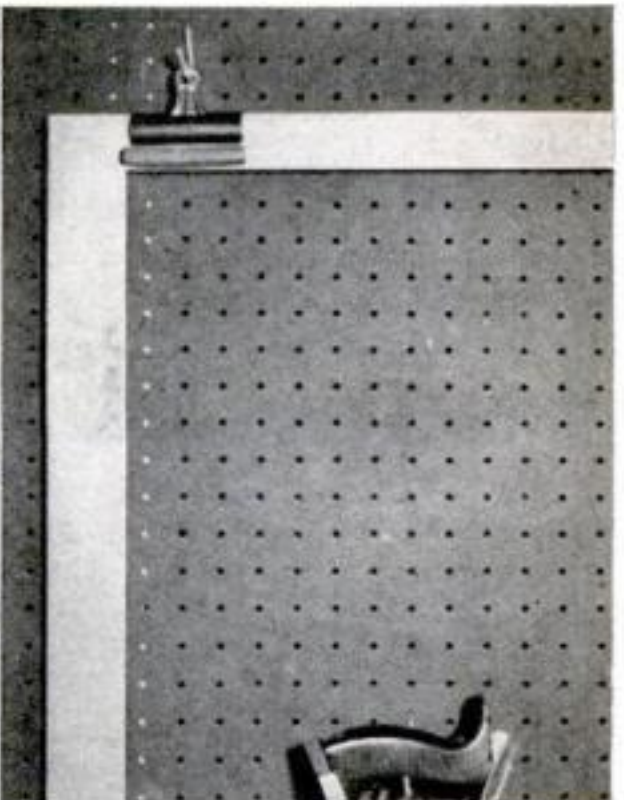
**SAW BLADES** won't get banged up if a spring clip holds the saw upright between jobs.



**SIMPLE HAIR TRIMMER** is made by clipping a razor blade—single or double-edged—to a comb.

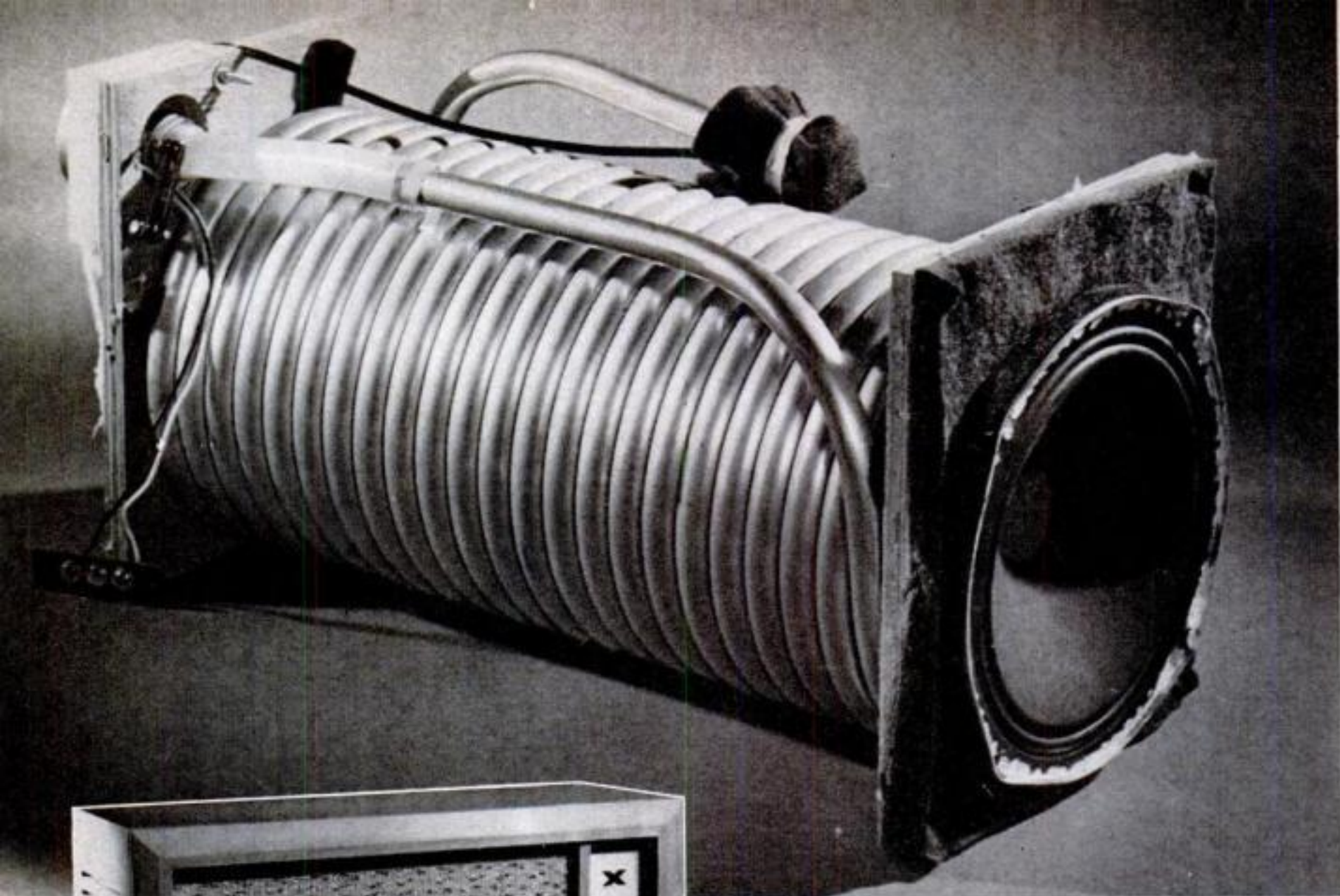


**HOLD RECIPE CARDS** upright for easy reference while cooking, with a clip and a water glass.



**UNWIELDY SQUARE** hangs better from a clip with jaws enclosed in slit pieces of rubber hose.





**DELAYED SOUND** produced by this new hi-fi unit gives concert-hall tone to home setups. It's done by piping waves through 50 feet of  $\frac{5}{8}$ " aluminum tubing coiled as above. Driver is mounted at far end. Microphone, to pick up waves, is on top under felt cover. With amplifier and loudspeaker, unit is mounted in cabinet at left. A separate loudness control lets you balance sound with that of existing speaker.

## Hi-Fi 'Plumbing' Adds Concert-Hall Realism

**T**HE hi-fi enthusiast who has everything but the kitchen sink in his sound system may now even dream of getting that in. A new entry in the mushrooming hi-fi field gives him a start on the plumbing. Fifty feet of aluminum tubing is the secret behind the startling realism of the sound from the Xophonic system.

Designed by Radio Craftsmen (4223 W. Jefferson Blvd., Los Angeles, 16), the Xophonic unit will sell for about \$100. It can be used with any hi-fi system. Plug it into an outlet, connect two wires to the speaker terminals of your present rig, and it is ready to play.

The system supplies an element of concert-hall listening that is often missing in home reproduction. The sound in a large auditorium has two parts: One you

hear coming directly from the performers; the other reaches you after reflection from the walls and ceiling, a fraction of a second later. The combination gives the full, rounded tone of the concert hall.

The Xophonic unit simulates the effect of these reflections by producing a second, delayed, sound that reaches you later than the sound from your main speaker. The tubing does this. The signal from the main amplifier is fed to a small speaker, or driver, mounted on one end of the pipe. You don't hear the sound from this speaker. It's confined to the air in the tubing and takes about  $\frac{1}{20}$  second to travel the length. A microphone at the other end picks up the sound and feeds this signal to the auxiliary amplifier in the Xophonic unit that drives the speaker you hear.—*Hubert Lockett.*



**A practical manual  
for Saturday mechanics:**

# How to Take Care of a '57 Chevy

**By William Carroll**

**U**NDER-HOOD maintenance of the 1957 Chevrolet begins with leaving the valves alone. That's because hydraulic lifters are standard on all models except competition Corvettes.

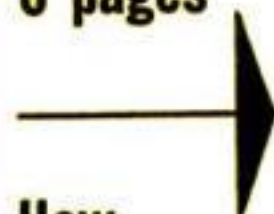
Fluid level in the cooling system should be one inch below the bottom of the filler neck with a cold engine. To drain a

Chevy, open the petcock in front of the radiator. Then, on the six, remove a pipe plug at the left rear of the block. On the V-8, there's a pipe plug low down on each side of the block.

Ignition is provided by a single breaker-point distributor with mechanical spark advance and vacuum control on the right side of sixes and at the rear of V-8's. Breaker points in the six adjust by loosen-



**On  
the next  
6 pages**



**How  
to adjust  
ignition,  
carburetor,  
lights,  
body  
alignment,  
brakes**



ing a lock screw and turning the eccentric adjusting screw to obtain a gap of .019" for new points or .016" for an old set. The V-8 engine uses a new external-adjustment distributor that can be adjusted for gap or dwell angle from outside while the engine is running.

**Basic timing advance** is exactly top dead center for the six, 4° before TDC for standard V-8, and 8° before TDC for Super V-8 with power pack. It is not unusual to find Chevrolets running six, eight, or even 10 degrees before TDC, but this is an advance that should be made only with careful road-testing.

In the spark-plug department, Chevrolet recommends the 14-mm. AC 44 for normal driving, but if your driving is usually "stop and go," the hotter AC 45 may improve economy and reduce fouling.

**Fuel is filtered three times:** at the tank, in the line filter, and through a strainer in the carburetor-bowl cover. Chevy uses two kinds of air cleaners to keep engine air pure. The standard cleaner uses a metallic-gauze filter element saturated with heavy oil, while the dusty-duty cleaner is the oil-bath type. Under normal operating conditions, a standard unit should be cleaned in solvent and oiled every 2,000 miles, while the oil-bath cleanser needs refreshing each 5,000 miles.

**Carburetor adjustments** are not difficult. First, be sure that the carburetor body, linkage and mountings are snug. Second, operate the engine for about 20 minutes at fast idle to bring it to operating temperature. Set the "hot" idle speed by adjusting the stop screw on the throttle arm to 450 to 500 r.p.m. for a standard transmission, or 400 to 450 r.p.m. for an automatic in Drive range. Turn the idle-mixture adjustment screws gradually and equally to right or left to give peak r.p.m. or the highest steady vacuum-gauge reading. If the engine idles fast after this, readjust the throttle stop screw until correct idle speed is obtained. Finally, recheck the idle-mixture adjustment.

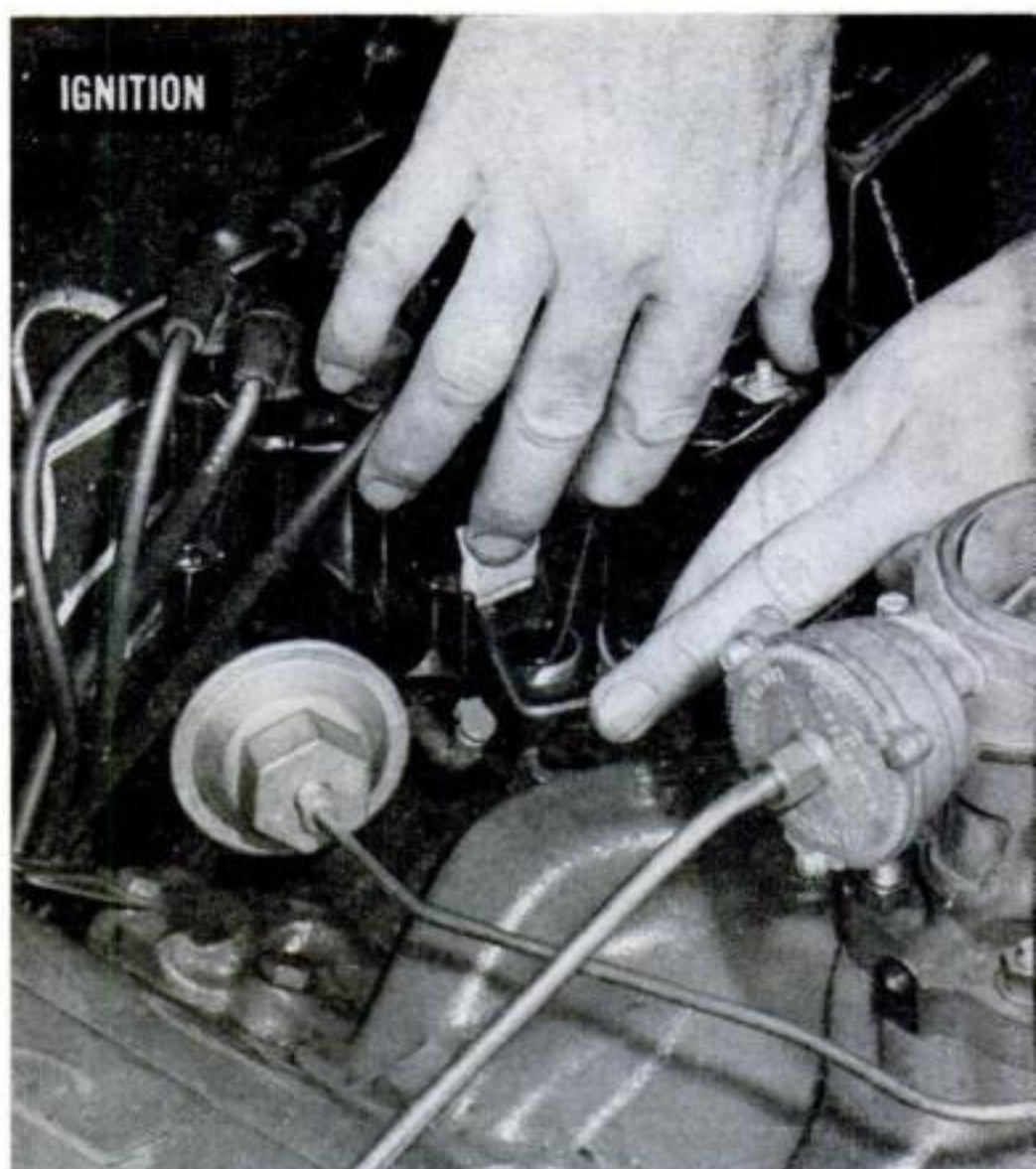
The automatic choke is normally set so

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#### NEXT MONTH...

Watch for the third in this series of shop-manual articles on the Big Three cars: *How to Take Care of a '57 Plymouth. The '57 Ford appeared in June PS.*

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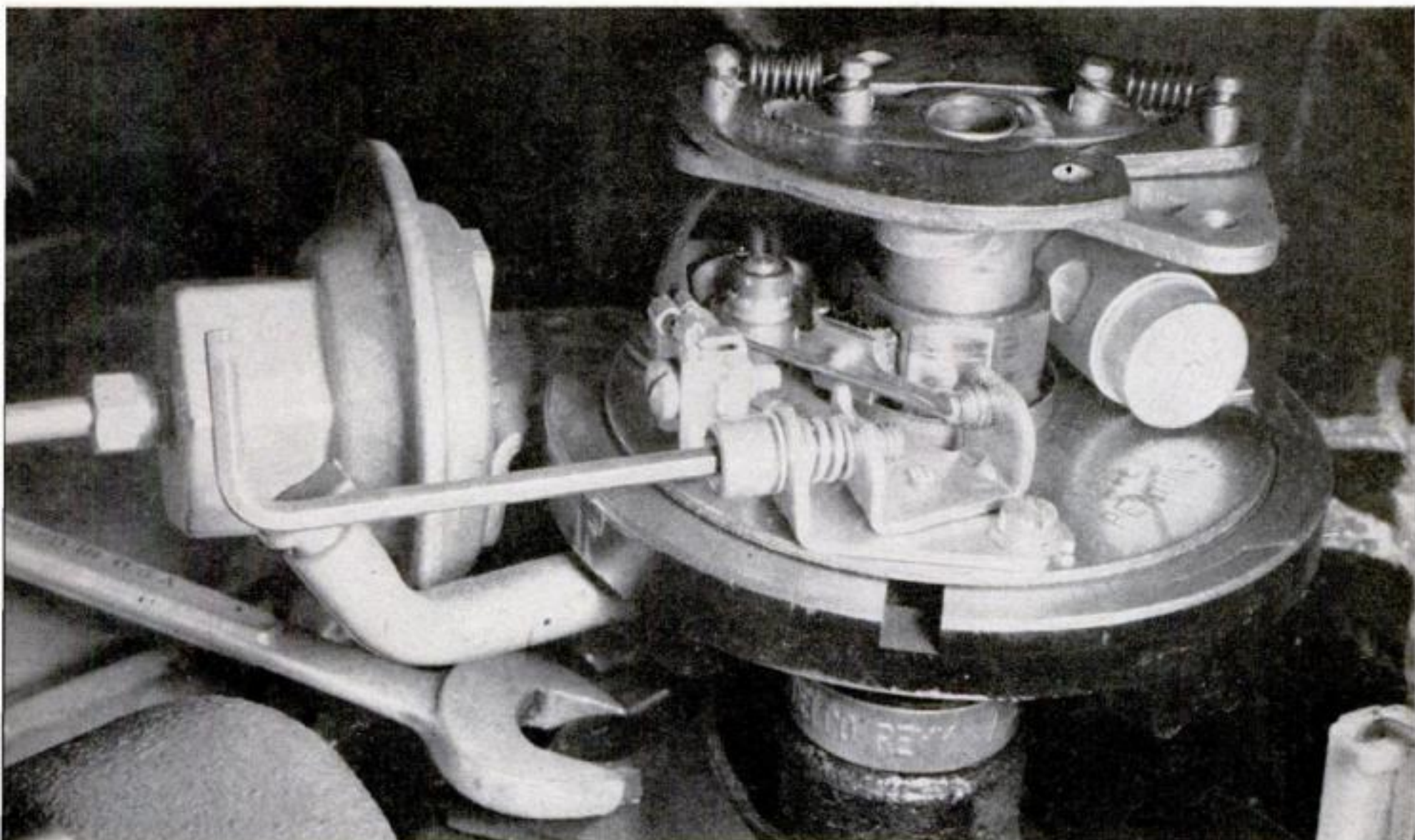
**NEW DELCO-REMY DISTRIBUTOR** has external point adjustment for setting the gap with the engine idling. Use a hex-key wrench to turn the adjusting screw clockwise until the engine misses. Then turn it exactly one-half turn in the opposite direction to get the proper gap.

an index mark on the movable cover lines up with a cast mark on the housing. To adjust on six-cylinder manual-shift models, rotate the cover one mark richer for each five deg. below 85 deg. (95 deg. on Powerglide and Turboglide); for each five deg. above, set one mark leaner. On V-8 engines, adjustment is based on a standard temperature of 75 deg.; on the Rochester four-barrel, the choke is adjusted on a basis of one mark for each 12 deg. above or below a 75-deg. temperature.

**Electrical power** in Chevrolets is stored by a 12-volt battery of 1.215 specific gravity. The generator requires only routine oiling and an occasional cleaning of the commutator. A dirty commutator is cleaned by holding No. 00 sandpaper or a commutator-cleaning stone against it while the generator is operating at idle speed. Never use emery cloth.

**Chevrolet bodies** conform to standard practice in door-adjustment methods. Remove the lock striker so the door is supported only by its hinges. Spacing at the sides, top and bottom should be 1/16" to 3/16". Loosen the bolts holding the hinge





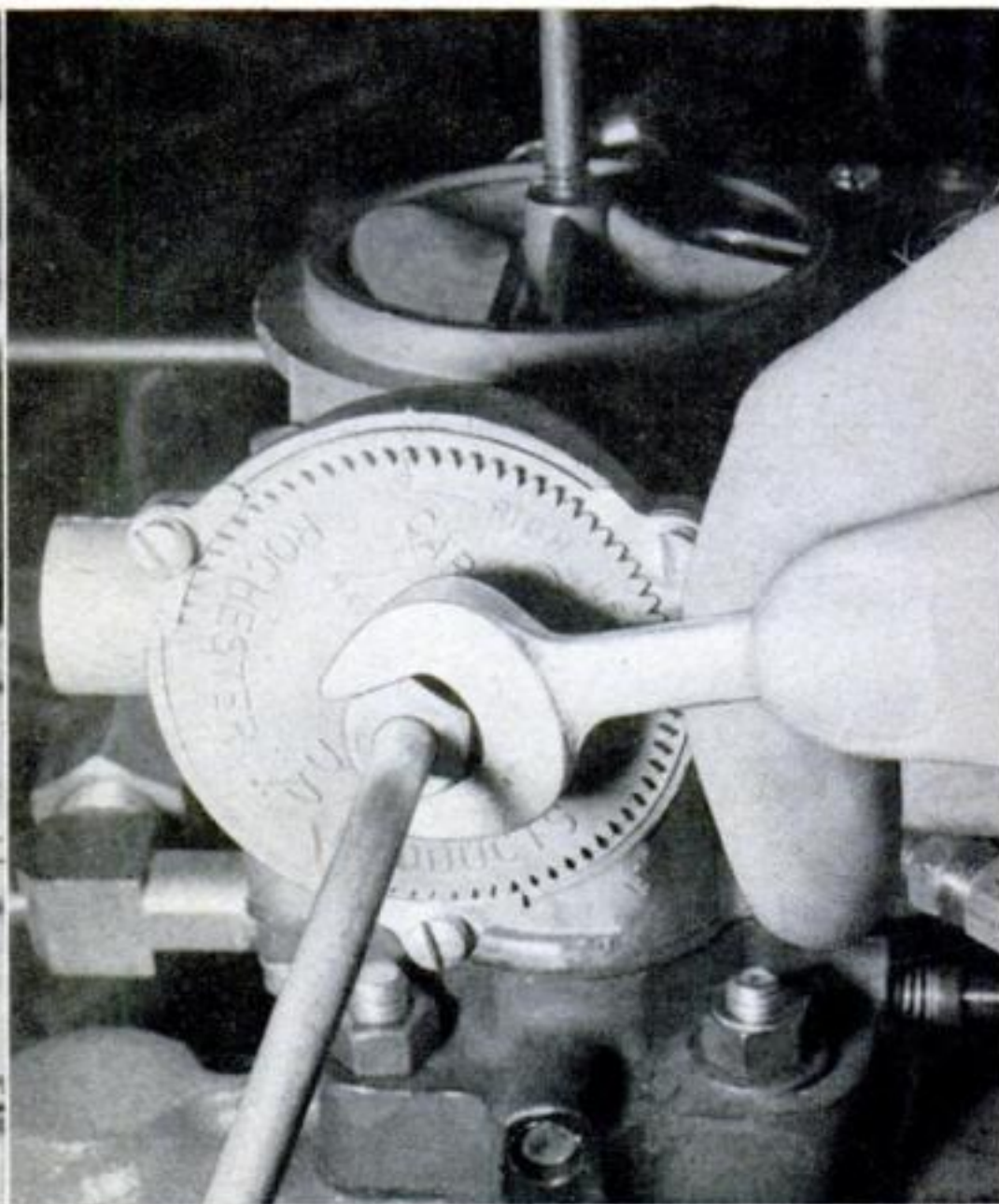
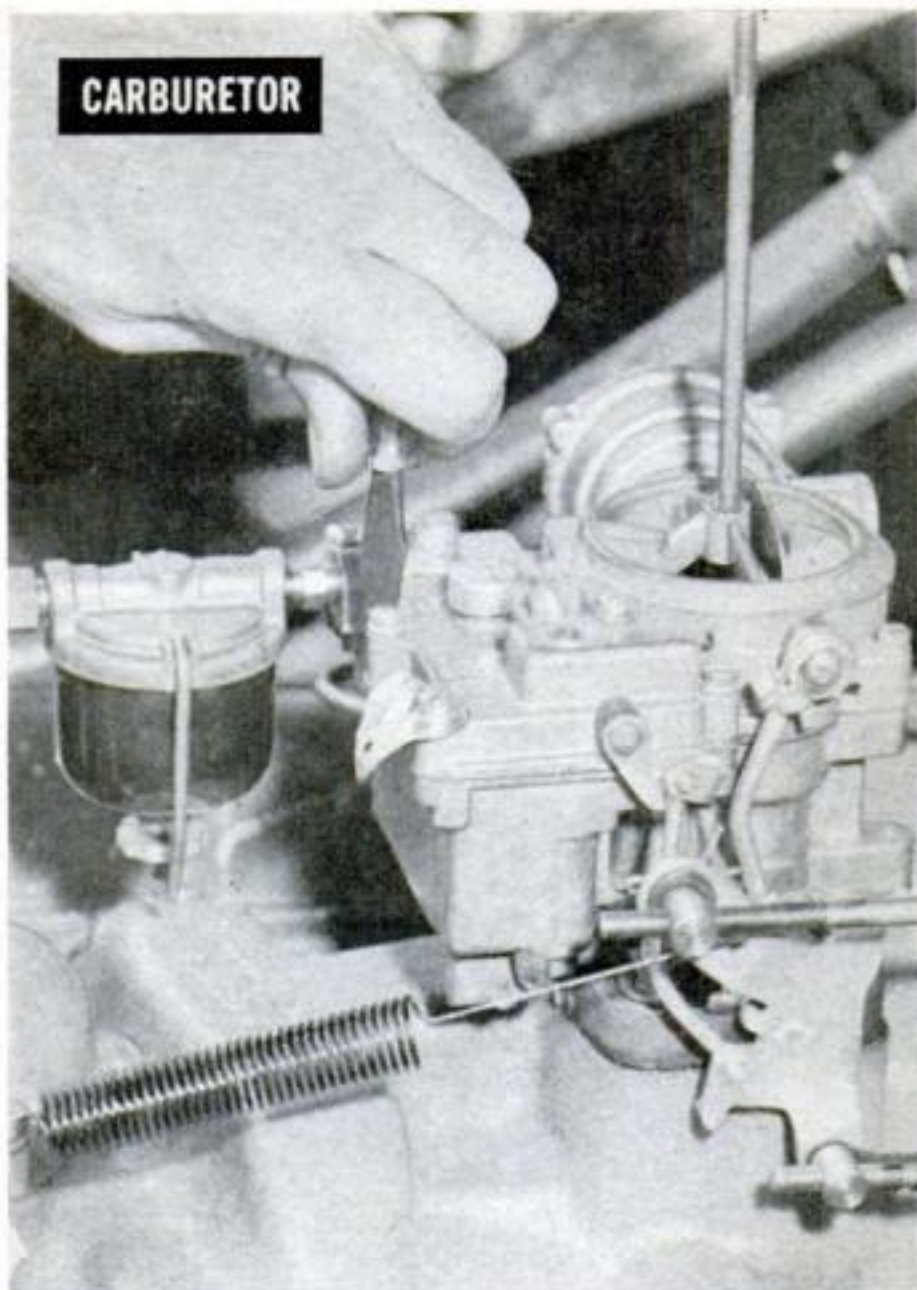
**WITH CAP OFF**, you can see the operation of the external point adjustment as shown above. The oil cup behind the hex-key wrench should be filled every 1,000 miles. A clamp bolt (held by open-end wrench) at the base of the distributor is loosened to change the timing.

**SINGLE TIMING MARK** (see below) on vibration damper is aligned with degree marks on calibrated scale to set ignition timing. Use timing-light hookup to No. 1 cylinder (front left) to align marks. On the six, a steel ball in the fly-wheel is aligned with a pointer.





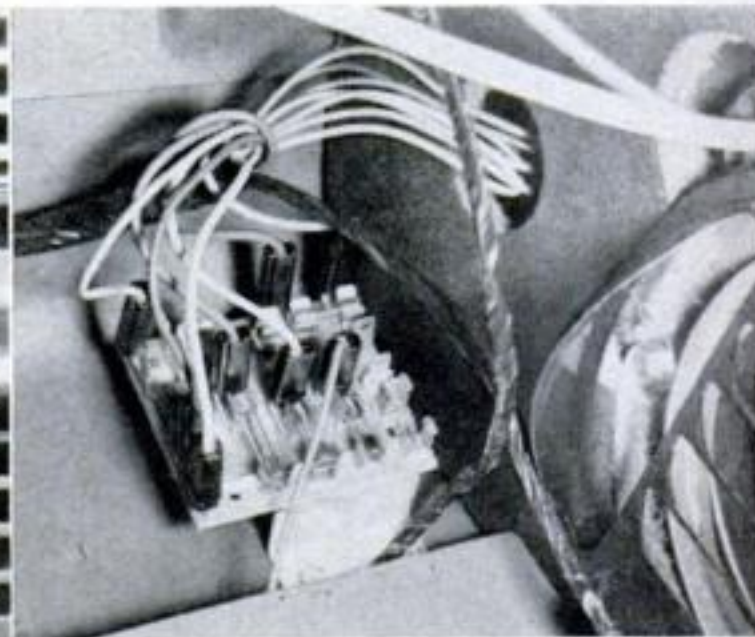
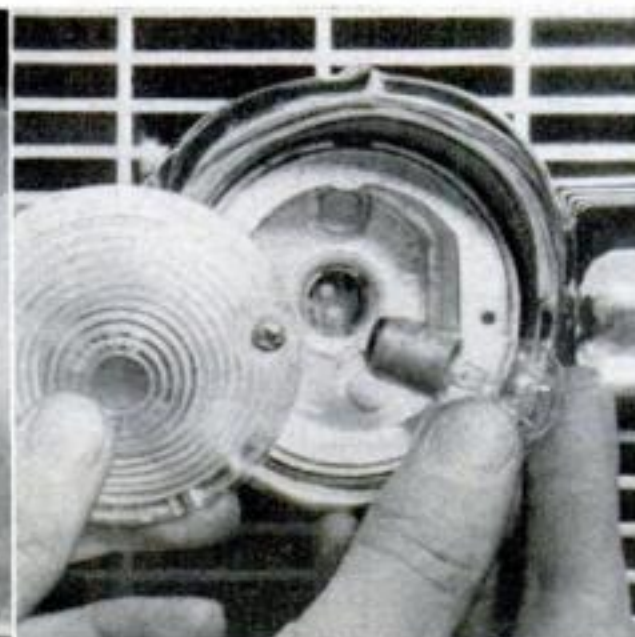
## CARBURETOR



**FIRST THING** in carburetor maintenance is to tighten lightly all assembly screws (as shown) and the manifold hold-down nuts to eliminate any possibility of air leakage. Don't overdo it, though, or you might warp the casting. Chevy has an in-line fuel filter, which should be drained and cleaned in solvent occasionally. Loosen the thumbscrew to remove the filter bowl.

**LOOSEN HEAT-TUBE FITTING** before adjusting choke control, then loosen three screws on rim (note index mark at top) and turn toward rich or lean as needed. If engine misses or is sluggish during warmup, rotate cover in direction of "rich" arrow. In summer, the cover should be rotated toward lean side. When adjusted, choke valve should barely close when carb is tapped.

## LIGHTS

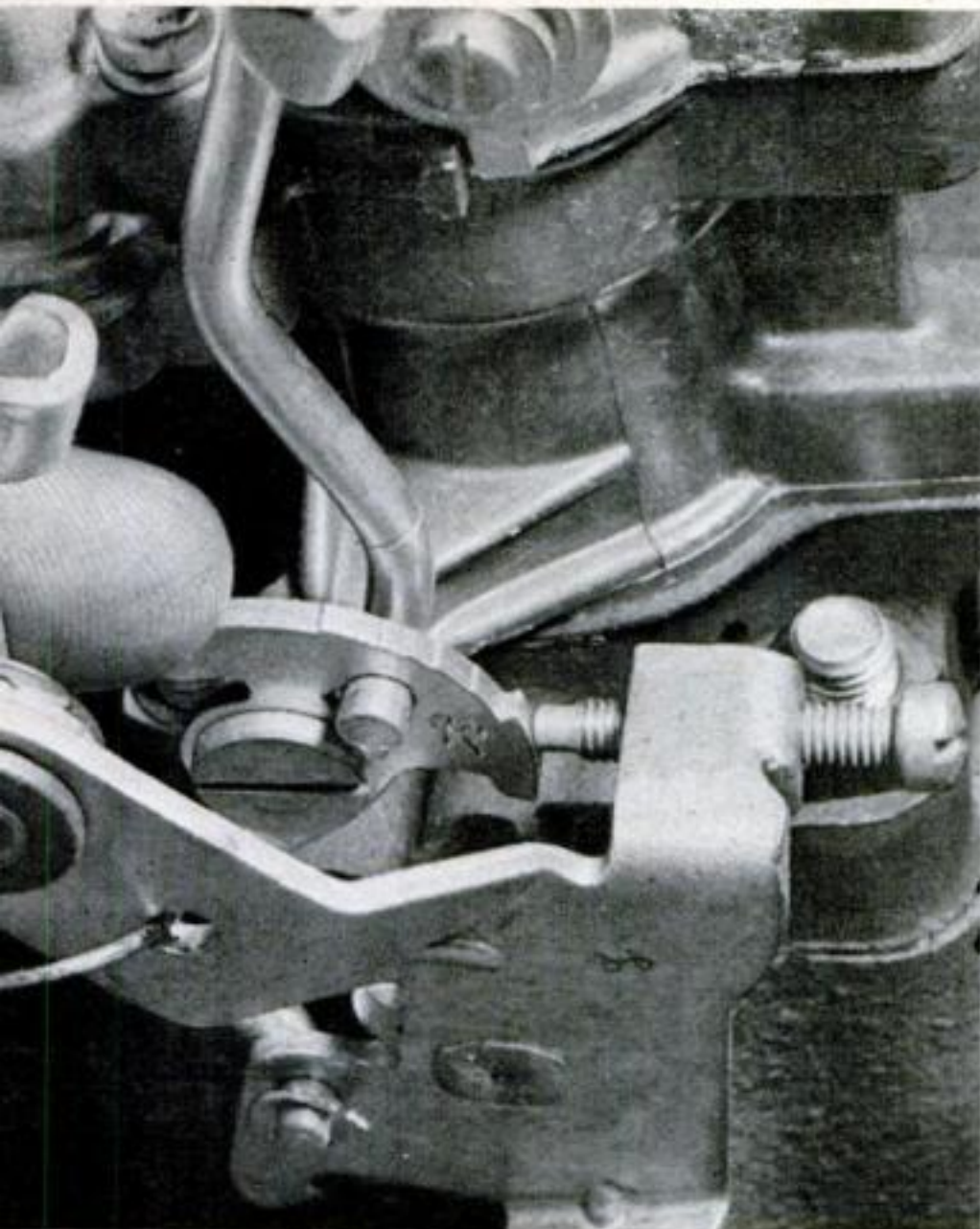


**REPLACEMENT** of Chevrolet headlights requires only the removal of the decorative rim and its four attaching screws. The sealed-beam lamp is held in place by a metal retaining ring. A hooked spring holds the entire assembly in position. There are two large screws near this ring which should not be turned as they control the aiming adjustment of the headlight beam.

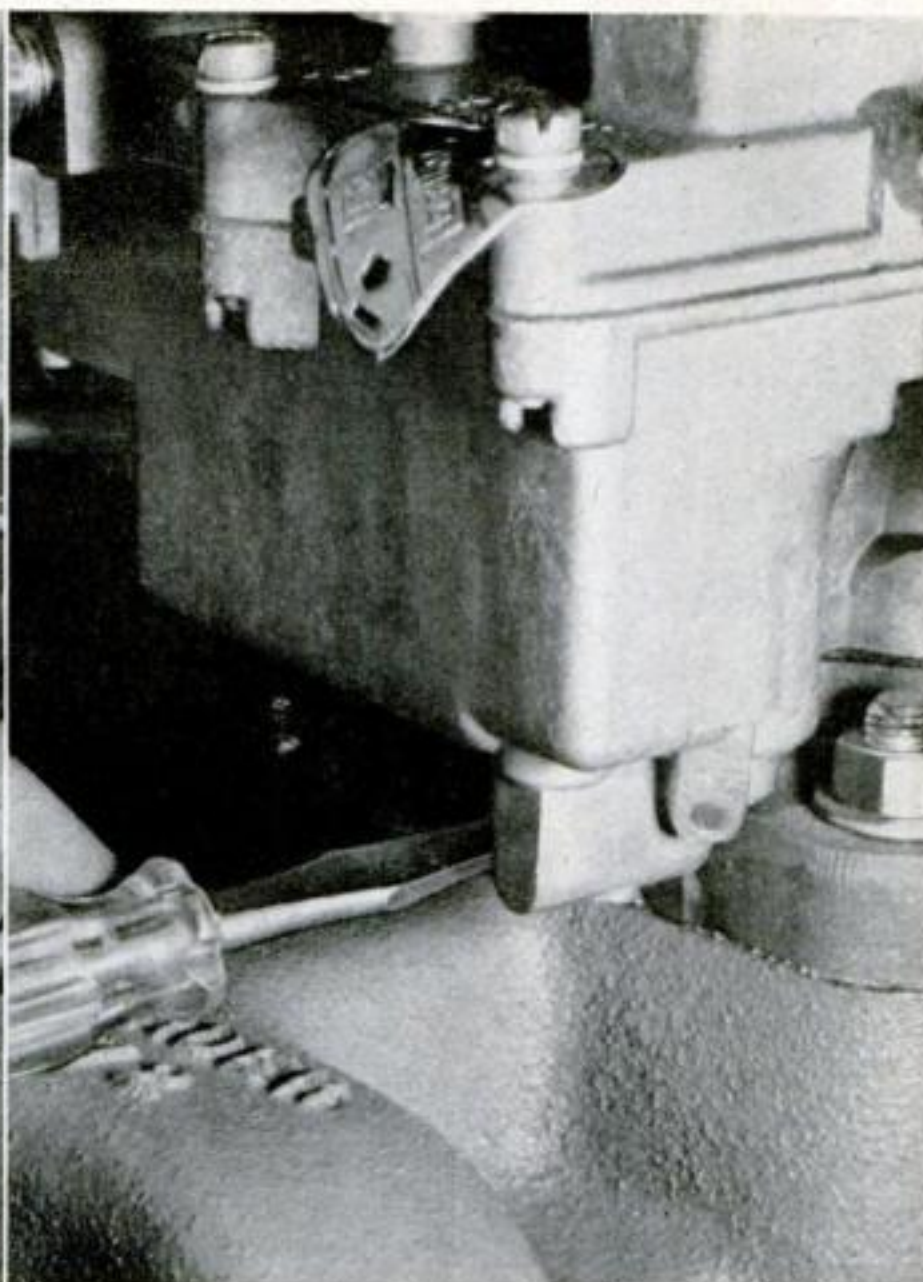
**PARKING-LIGHT** and directional-signal bulbs are replaced by removing the screws that hold the plastic lens in place. The bulbs only go in one way due to an offset pin in their base. If you have trouble twisting one into its "lock" position, turn it 180 degrees and it will fit easily. Replace lenses with lettering up, so that the drain openings will be down at the bottom.

**FUSE PANEL** and junction block is located to the left of the driver's feet and high up behind the instrument panel. The heater and radio are separately fused as are the clock and windshield wiper. Headlamps and parking lights are protected by a 13-amp circuit breaker mounted on the light switch. The overdrive fuse is located in the wire on the engine side of the cowl panel.

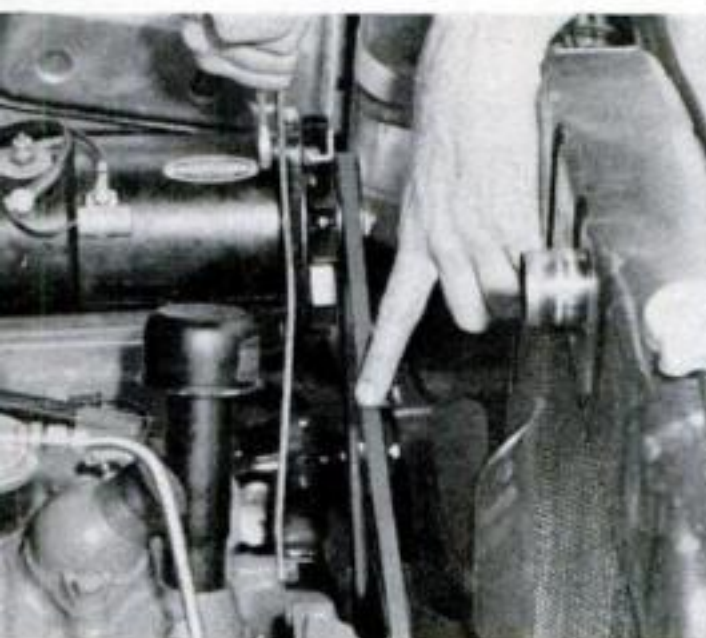




**STEPPED CAM**, controlled by automatic choke, causes the engine to idle faster during warmup. When the engine heats, the cam rotates so that the portion beneath the finger contacts the throttle-adjusting screw. In all cases, when you are making the idle-speed adjustment, the engine must be warm and the adjusting screw resting against this low part of the cam, as above.



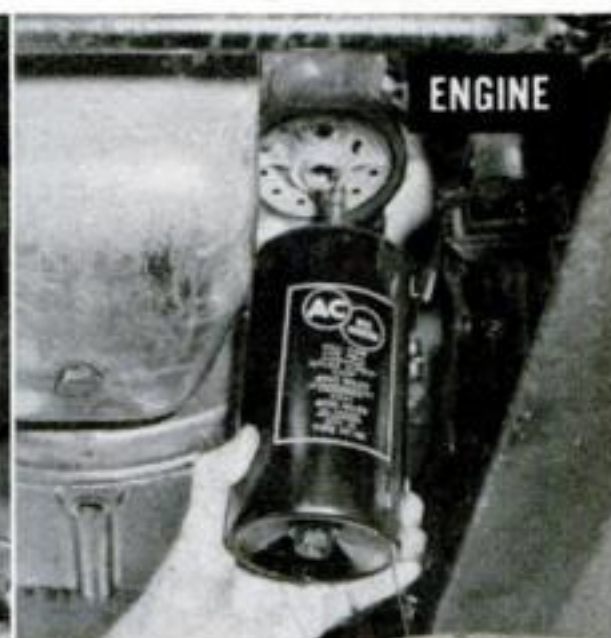
**WHEN RESETTING** the idle-mixture adjustment, the automatic transmission must be in Drive (with hand brake set!) while the engine is idling. Turn each mixture screw equally in or out to obtain peak r.p.m. or highest reading on vacuum gauge. Don't turn the screws tightly against their seat or you could damage the needles and make it impossible to achieve a smooth idle.



**FAN-BELT ADJUSTMENT** is taken care of by loosening a bolt at the generator's slotted bracket. With light finger pressure midway between the water-pump pulley and the generator pulley, a belt that's broken in should deflect  $5/16$ " on the six and  $13/16$ " on V-8's. You should go over all generator mounting bolts after a belt adjustment and tighten them securely.



**TWO LARGE HOLES** are found in the water-pump housing—one at the top and one at the bottom. These are air vents and should not be oiled, but instead kept free from grease or dirt which might impair the drainage of the water-pump bearings. With the engine stopped, run the tip of a wire through these holes to make sure they're open, or blow compressed air through them.



**TO REPLACE OIL FILTER** without taking a bath in hot oil, loosen the center bolt about two turns, then lightly tap the housing with a fiber hammer to unseat it. Wait a few minutes for the oil to stop dripping, then completely unscrew the center bolt and remove the filter. Rinse the housing with solvent before installing a new filter, and use a new gasket with it.





**HOOD ALIGNMENT** is accomplished by loosening the two bolts holding each hinge to the hood frame. Elongated holes permit shifting the hood so it matches the surrounding sheet metal. The hood can be raised or lowered at the rear by slightly loosening the bolts that hold the hinge assemblies to the cowl. Check and tighten all bolts after completing the adjustment.

**LEVELING SCREWS** at each front corner of the hood align it with fender sheet metal when it is shut. Pull off the rubber tip, loosen the lock nut and adjust each screw to its proper height. Reset the lock nut to hold the adjustment, and press the rubber tip in place on the head of the screw. If the hood fits well but rattles, the screws may have been turned in too far.

**TRUNK LID** has torsion bars instead of coil springs to hold it open. Ends of the torsion bars fit in one of three notches on each hinge housing. Use a short length of pipe to move the bars to a new position if your lid opens too fast or barely stays raised. Bars don't have to be in the same notch on each side. Merely adjust them to obtain the desired lid action.

box to pillar to move the door up, down, in or out. To shift doors fore and aft, you must remove the interior trim to reach door-to-hinge bolts.

Body parts to be lubed twice a year include: glove-compartment door hinge, door hold-open clips, door light switch, lock bolt and striker, door hinges, window regulator rack and cam, and hinges on deck lid, hood and gas-filler door.

Beauty care for a Chevy is pleasingly simple as most bright metal is stainless steel. Exceptions are the aluminum grille and broad rear-panel inserts on deluxe models. Some caustic solutions used in steam cleaning destroy the color of this aluminum trim—a caution you might pass along to the local auto laundry. Most Chevrolets have a rubbed-lacquer paint job, while a few models have come out with DuPont Lucite lacquer. The latter requires the least care, but it should not be waxed or polished with silicone for at least 60 days after the car's delivery.

**Steering maintenance** has dissolved to almost nothing. The gear case is factory-filled with a special all-season lubricant and changes are unnecessary. The power-steering installation has a pump mounted on the rear of the generator. No service is required except to maintain the fluid level. Check the dipstick each 1,000 miles and add only automatic-transmission fluid

type "A," bearing an "AQ-ATF" number.

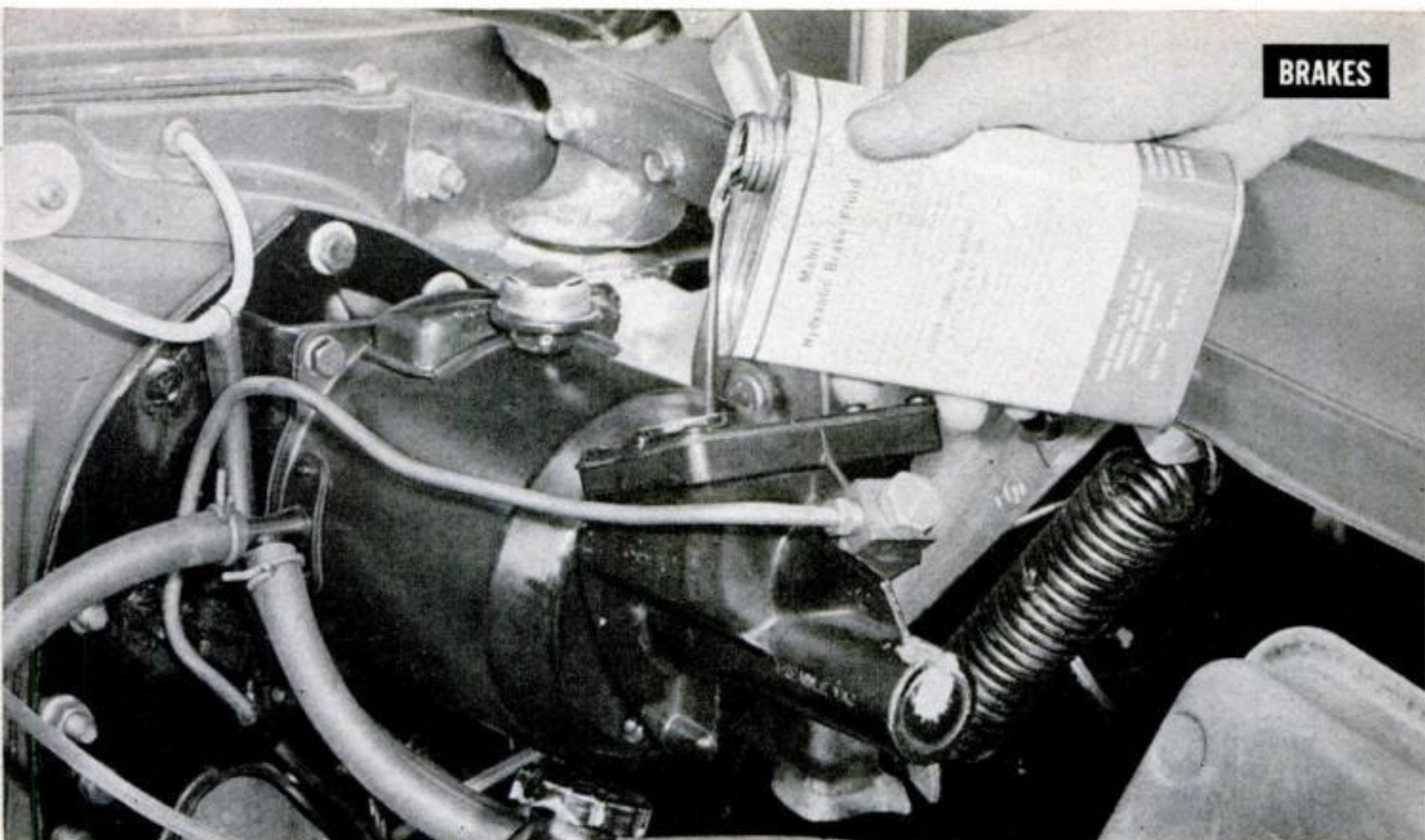
The four transmission options are: conventional, overdrive, Powerglide and Turboglide. Both automatics use type "A" fluid, and the level should be checked every 1,000 miles. Add fluid only when the level is below the FULL mark on the dipstick and the oil is at operating temperature. Don't overfill. Excess oil will cause foaming which may result in malfunction of transmission controls.

**To push-start an automatic**, turn on the key, place the selector in "N" and push the car until it attains a speed of 25 to 30 m.p.h. Then move the lever to "L" (or "GR" for Turboglide). After the engine starts, move the selector to "Drive" and proceed.

Under normal conditions, drain the crankcase and refill with fresh oil every 2,000 miles—but only after the engine has been thoroughly warmed. If the crankcase is drained when cold, some suspended foreign material will cling to the oil pan and not drain out with the cold, slow-moving oil. Should you ever want to flush the crankcase, use three quarts of SAE 10W oil. Run the engine at fast idle until the oil is hot, then drain immediately and refill with regular oil.

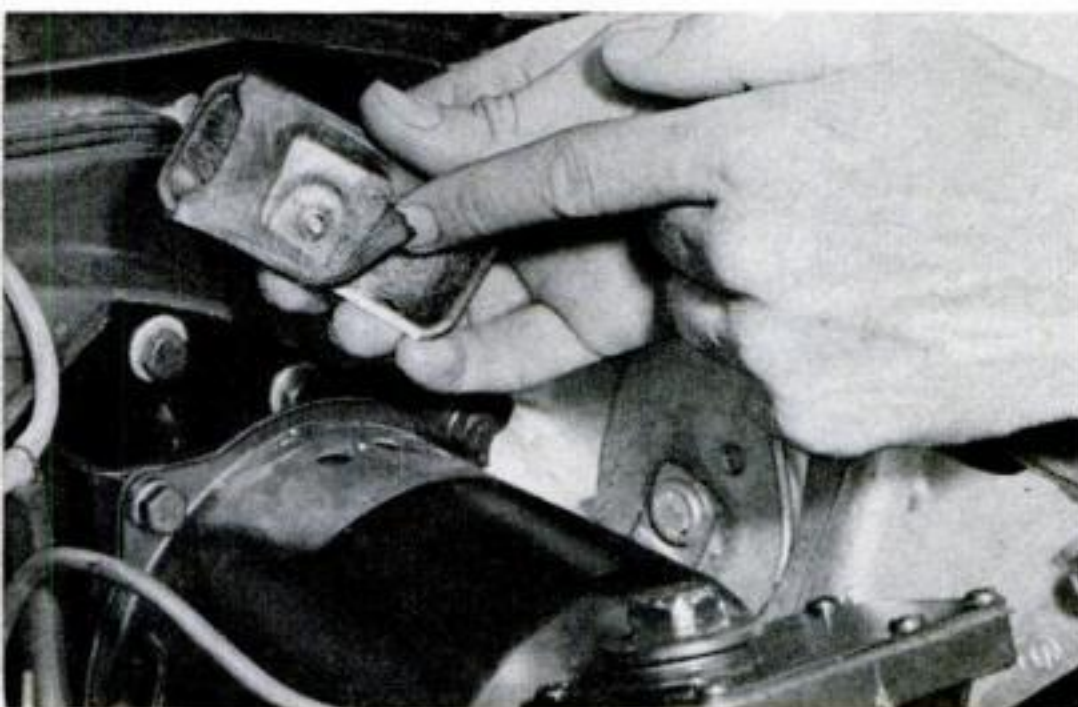
A **full-flow oil filter** (optional on V-8's) filters all oil delivered by the spur-gear pump. The cartridge should be





**FILL BRAKE MASTER CYLINDER** with high-quality, heavy-duty brake fluid to avoid the possibility of vapor lock in hot weather or thickening of fluid in cold weather. With power brakes, main-

tain the fluid level a half-inch from the top of the filler opening, checking only when the fluid is warm. Fill standard brakes so the fluid level comes to the bottom of the filler neck.



**POWER BRAKES** require no service except a twice-yearly cleaning of the air cleaner. The fine hair element should be washed in solvent to remove any dirt that has become packed inside, thus opening it up for easier air intake. Allow it to dry thoroughly before reinstalling it and don't oil the element. A single bolt in the center of the housing holds it in position.



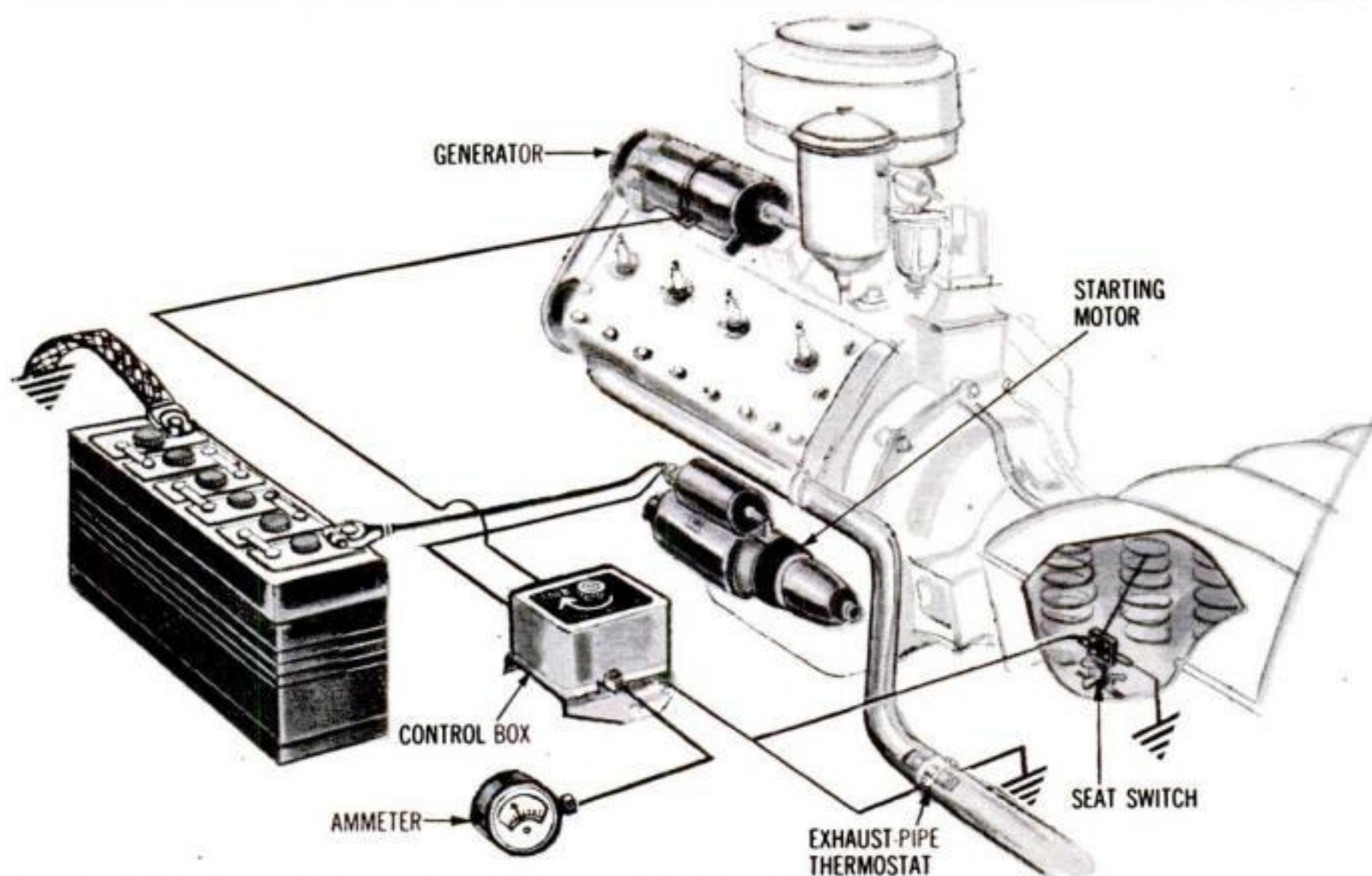
**BRAKE ADJUSTMENT** on the Chevy is as easy as ever. Jack up the wheel, remove the adjusting-hole cover and turn the notched adjusting screw until a light drag is felt as the wheel is rotated. Back off the adjusting screw exactly seven notches to obtain the proper running clearance between the brake shoe and the drum. Finally, replace the protective hole cover.

changed every 6,000 miles, keeping in mind that an extra quart of oil is required to bring the crankcase to the full mark when the cartridge is replaced. Engine life is prolonged by the crankcase ventilating system which includes the filter cap on the

oil filler and a draft tube extending below the pan. Clean the filter cap in solvent every 3,000 miles and oil the mesh after the solvent dries. The draft tube seldom needs attention, but should be cleaned when the engine is overhauled. **END**



# New for Your Car



**1. Seat Switch "Remembers" Your Lights.** If you dash into the house and forget to turn off your lights, a new switch will do it for you, saving you a run-down battery.

As you slide off the seat, the springs expand, pulling a cord that opens a normally closed switch. In parallel is an off-when-cool thermostatic switch clamped to the exhaust pipe. It opens about 30 minutes after you stop the engine.

When both of these switches are open, a master relay breaks the power line between battery and ammeter, cutting off all accessories. They can't go on again until the driver's seat is depressed, closing the switch. What happens if you just get out to close the garage door before the exhaust pipe has had a chance to heat up? A separate circuit is arranged to keep power flowing to the ignition as long as the engine is running.



**2. Pad Cleans Bugs Off Chrome.** Nylon fibers bonded into a pad with phenolic resin provide a mild, non-scratch, scouring action that will take stubborn insect splatters and road film off chromework, lacquered surfaces and windshields. The pad is used slightly moistened with a little soap powder or detergent. It also serves as a polish applicator.

More information about these new car products can be obtained from: 1. Servomatic, 1710 Harper Ave., Redondo Beach, Calif.; 2. The Livingston Co., Amity Rd., New Haven 15, Conn.



# 3 Modern Planters



*French tole planter, lighted inside, is antiqued with umber over pale undercoat*

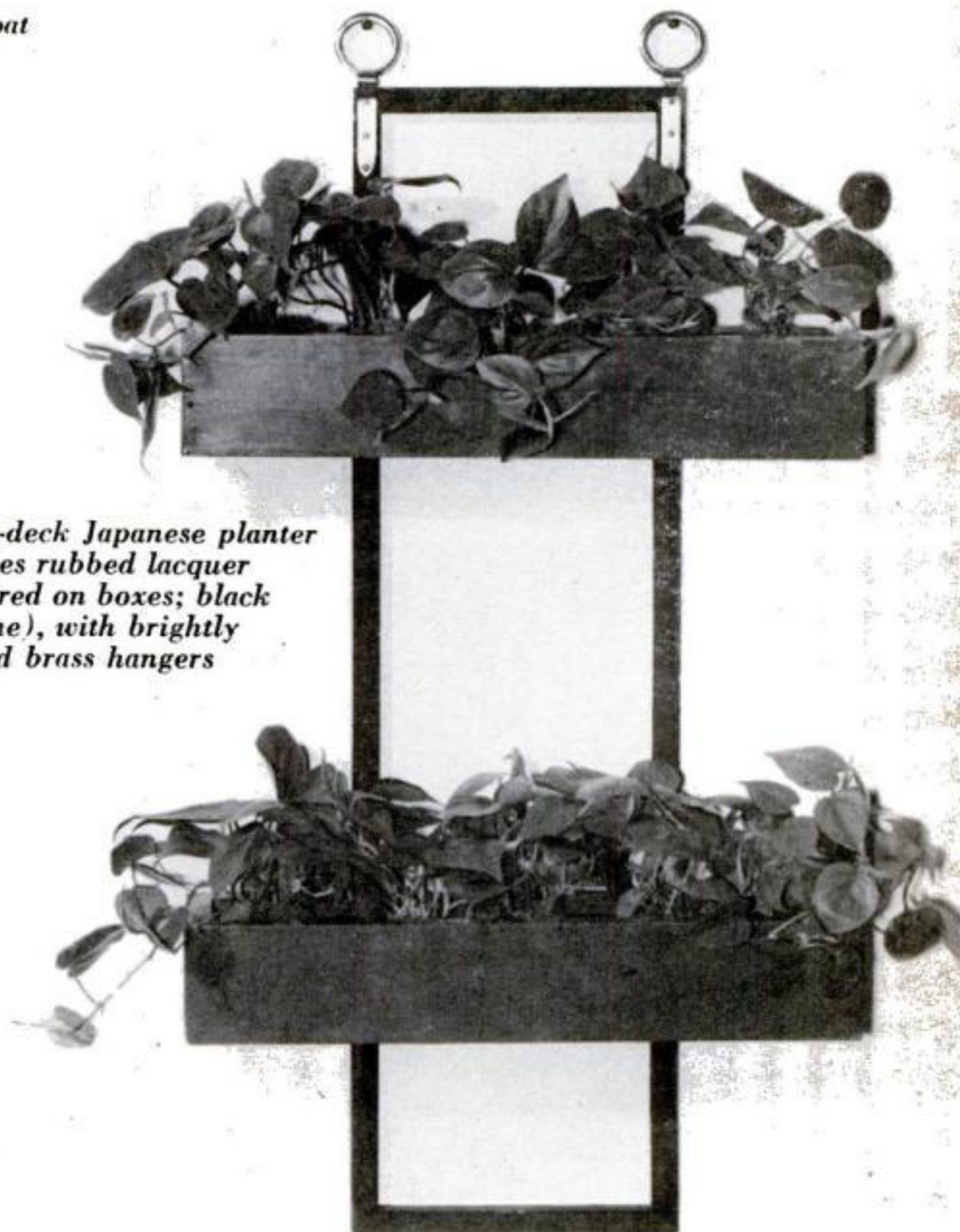
**T**AKE your pick: French tole, Japanese or Polynesian—at least one of these smartly styled wall planters should suit your home. Created for **POPULAR SCIENCE** by prominent artist-designer Harry Marinsky, all three are as easy to build as they are pleasingly simple in form. The materials may be no farther away than your basement or kitchen, and there is plenty of chance to improvise. You could, for example, use aluminum bread-baking pans instead of wooden boxes for the Japanese planter, or tin-can stock, lined with asphaltum, for the French tole piece.

**How to build them** →



*Polynesian planter contrasts matchstick-bamboo cylinder (mats wrapped about a tin-can liner) with "ebony" plaque*

*Double-deck Japanese planter combines rubbed lacquer finish (red on boxes; black on frame), with brightly polished brass hangers*

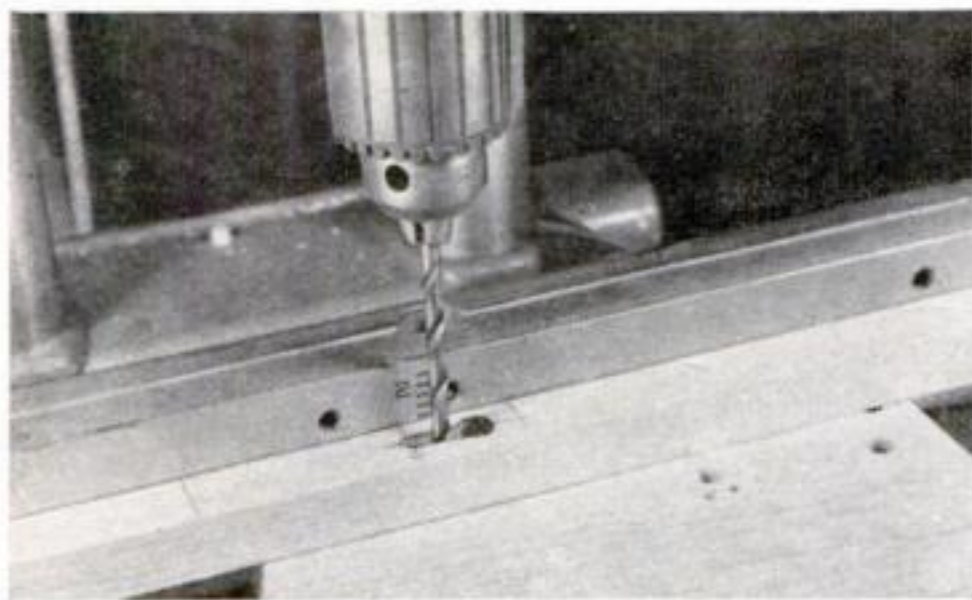




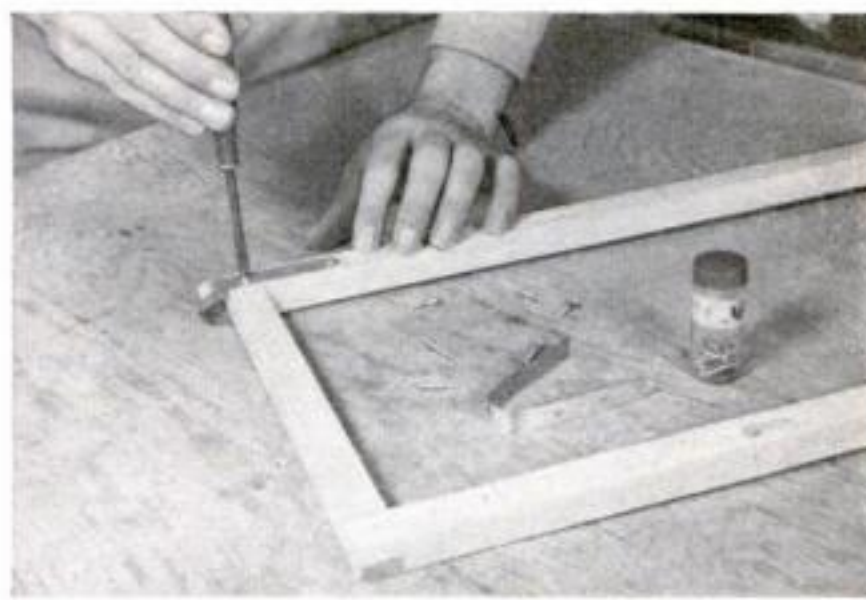




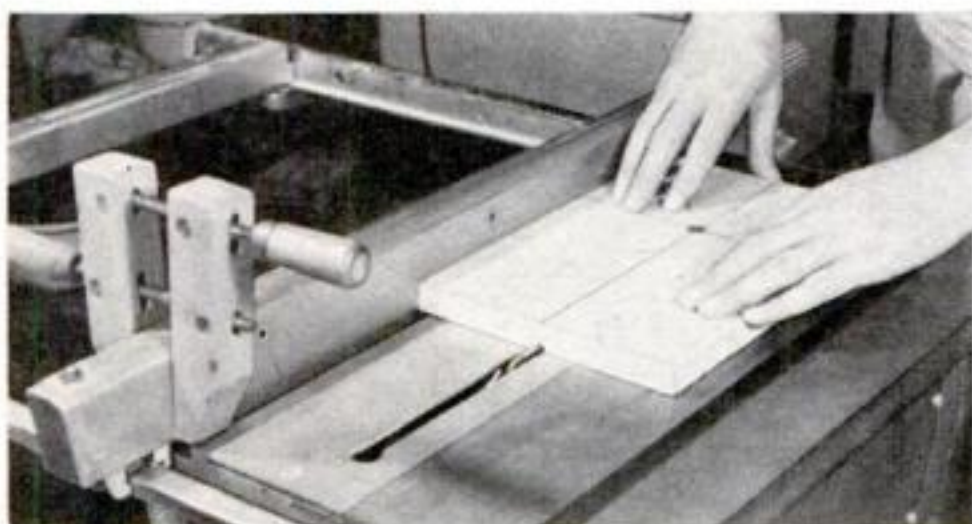
**materials are easy to find and cost next to nothing**



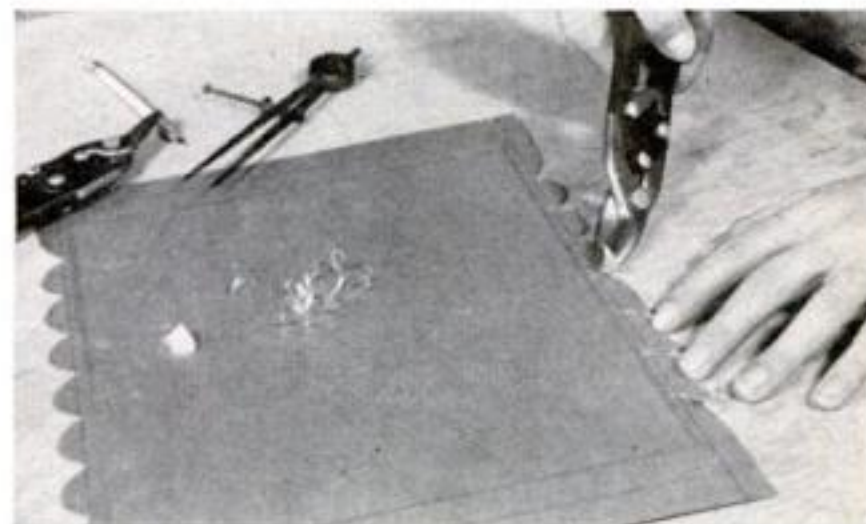
leaving  $\frac{3}{4}$ " projections. Drill keyhole slots in sides of frame to take wood-screw hangers (above). Use  $\frac{3}{8}$ " drill for screwheads, and series of  $\frac{1}{8}$ " holes for screw shanks. File out intermediate stock to form continuous slots. Give frame and boxes two coats of shellac, each followed by light sanding. Then spray black lac-



quer on frame, bright red lacquer on boxes, using "paint bomb." Apply as many light coats as necessary. Cut, drill and bend hanger straps from brass. After polishing, attach them to the frame with brass screws, inserting large drapery rings or door-pull rings in the strap loops before driving screws on the rear of the frame.



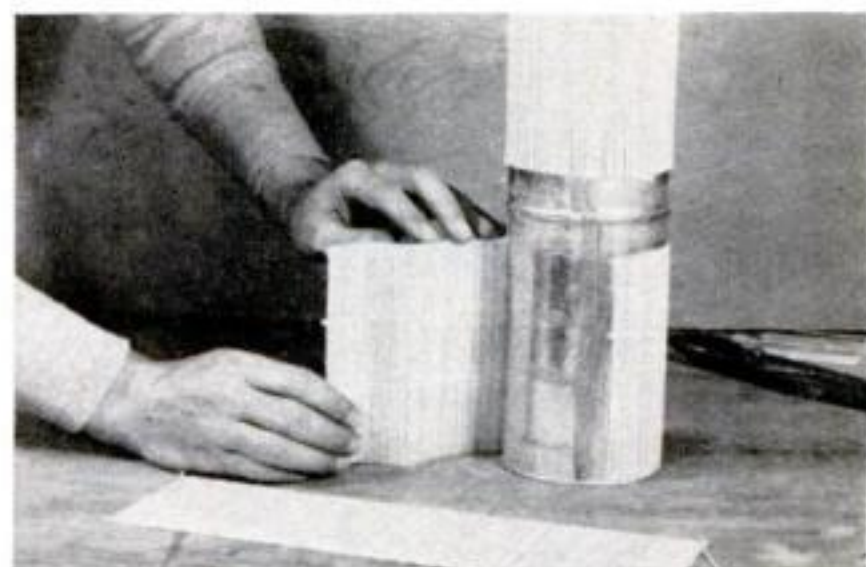
curved member, and thread cord through holes and slot. Make wraparound sheet from do-it-yourself aluminum. Cut straight edges and scallops with tin snips; bore holes with  $\frac{1}{8}$ " drill. Bend right-angle flange on one side. Lap flange over one edge of wall plate and secure with small escutcheon pins. Then wrap sheet around



curved member and again secure with pins. Over thoroughly dry white or cream undercoat, apply equal parts of glazing liquid and turpentine, tinted with umber. Let glaze set. Then wipe in vertical strokes with cloth dampened in turps. When the surface is completely dry, apply a protective coat of satin-finish varnish.



from brass tubing. Drill mating holes in bottoms of fruit cans for short bolt that holds them together. Also drill holes in side walls of cans (above), starting with a small drill and working up to  $\frac{1}{4}$ ". Bolt cans together and paint interior of upper one with asphaltum. Apply contact cement to outer surface of cans; also to inside



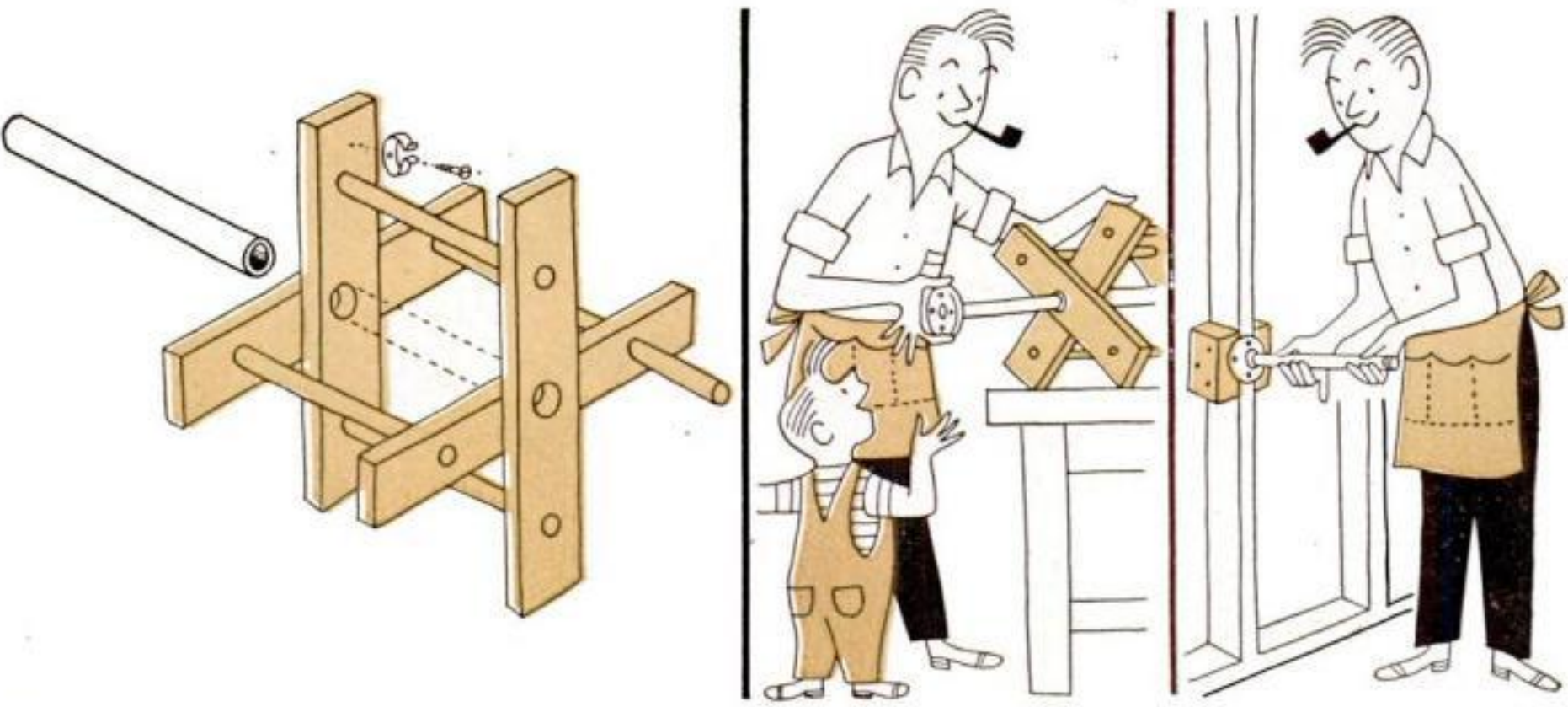
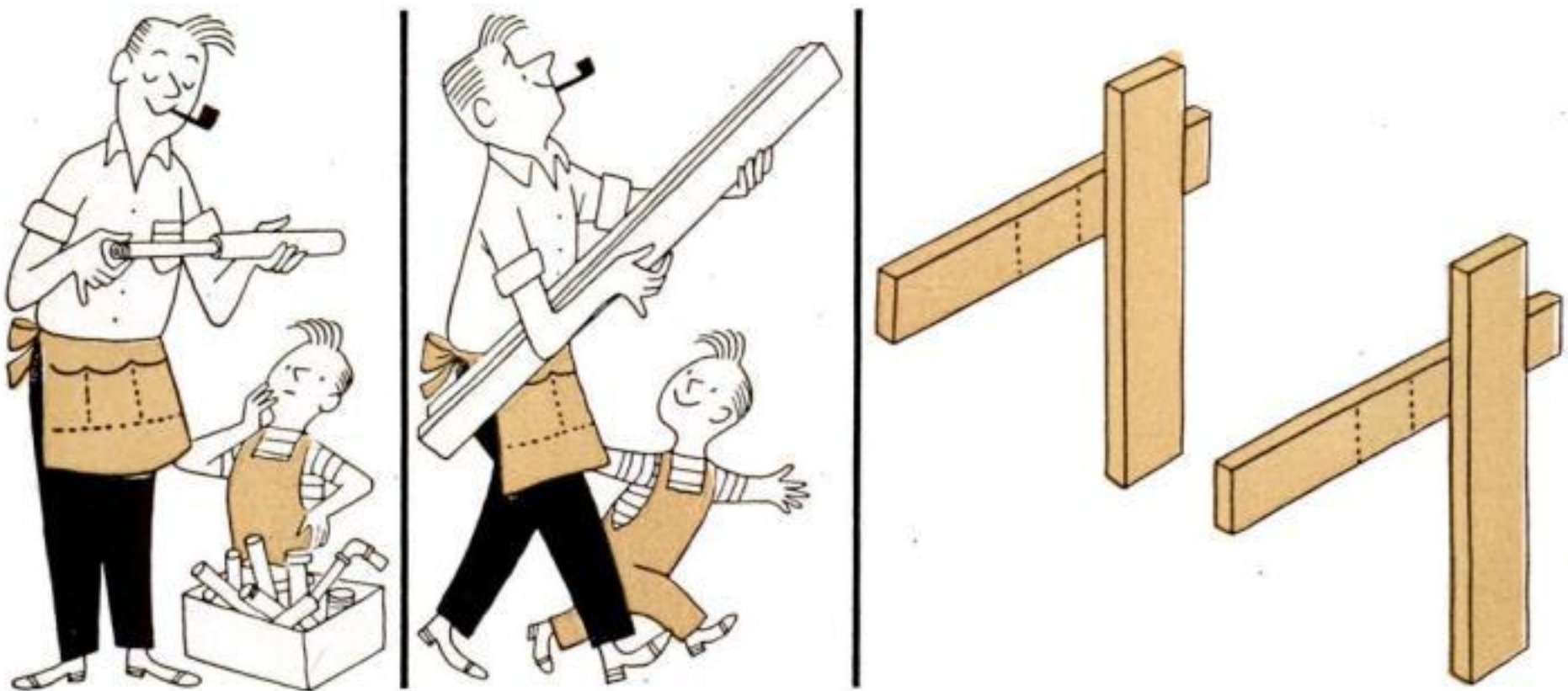
faces of three matchstick-bamboo strips. When cement dries apply strips as shown above, starting at one edge. Remove bamboo from bolt-hole areas with a sharp knife. Shellac and then paint wall plate, using black-lacquer spray bomb. Attach the cylinder to the wall plate with a pair of brass-sleeved bolts.

END

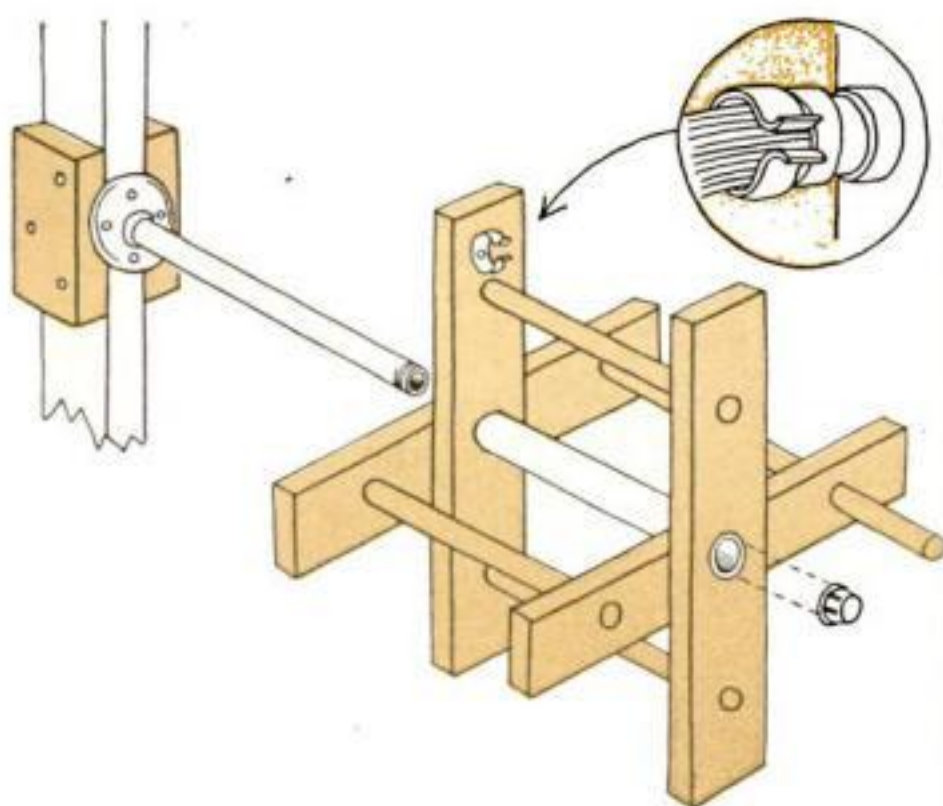
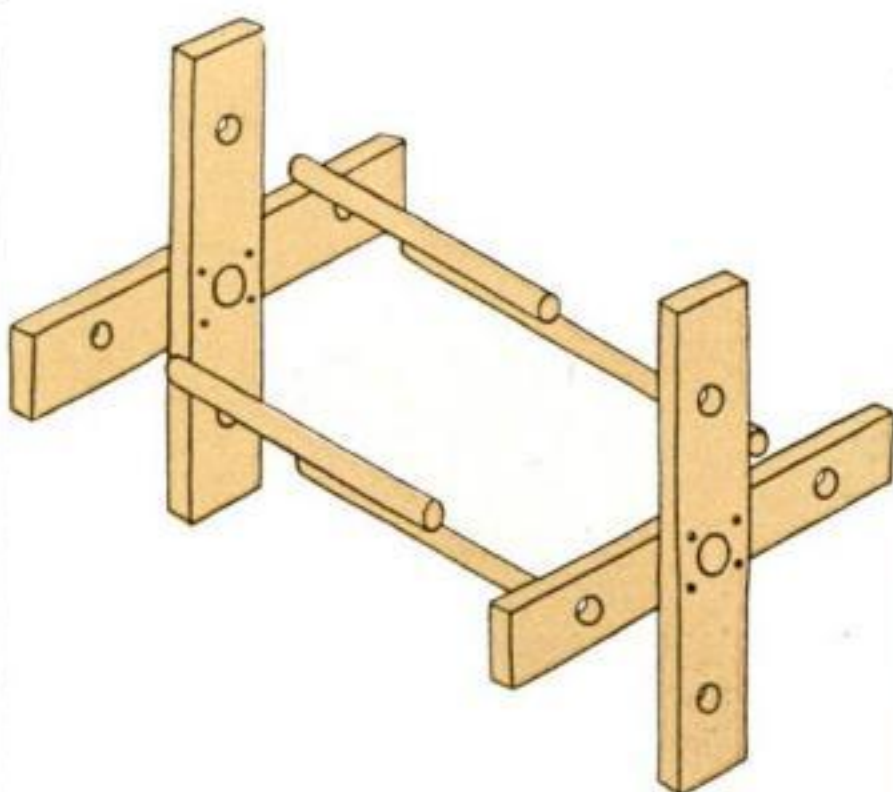
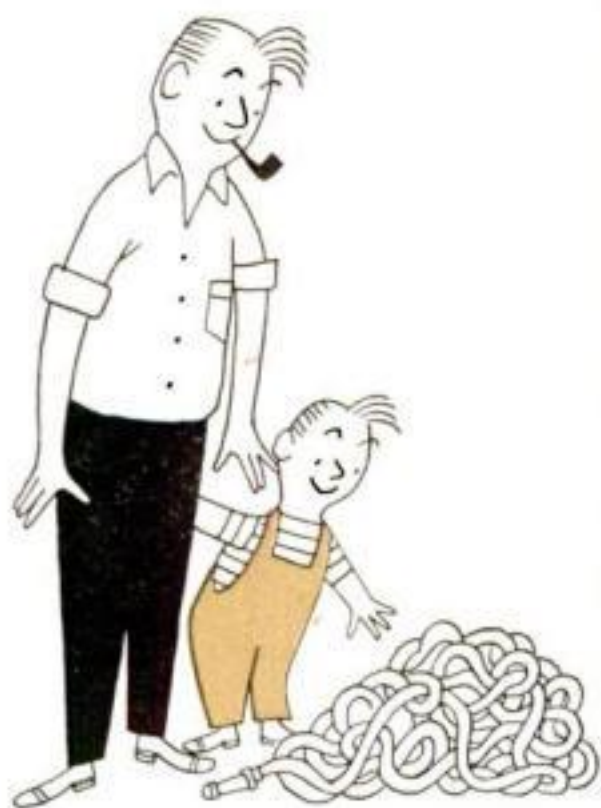


# Wordless Workshop

By Roy Doty  
and Devon Francis





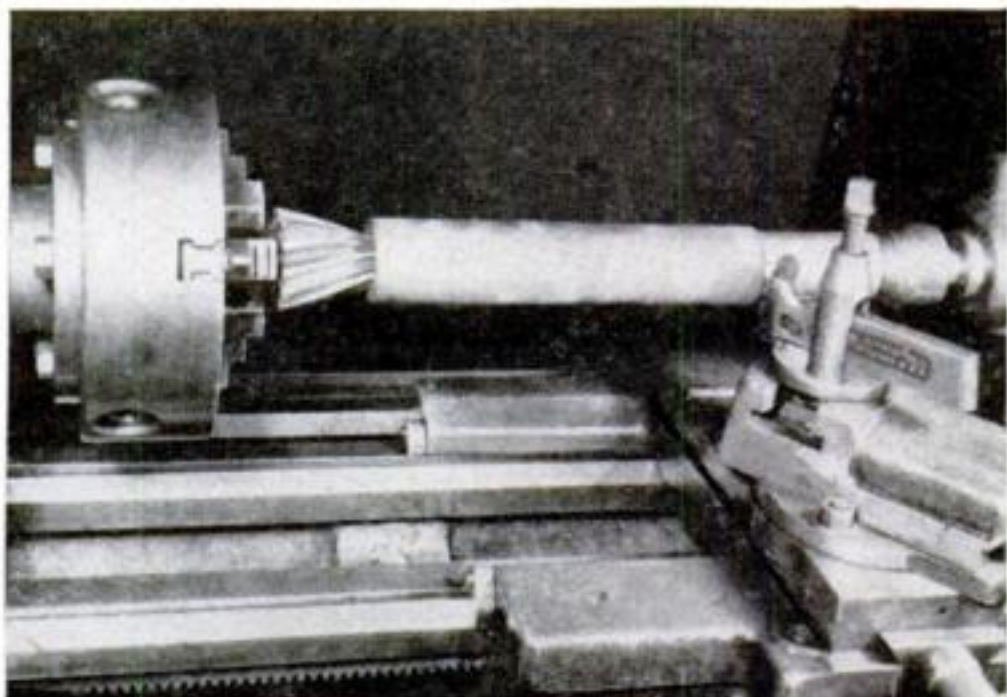


**Next Month: A simple time latch for releasing your dog**

JULY 1957 161



# PS Shop Notebook



## *Reamer Drives Lathe Work*

A taper reamer, in place of the usual lathe dog, drives pipe, tubing, and rod drilled at one end—so that the work can be turned for its entire length in one operation. The reamer's flutes prevent slipping except on very heavy cuts. Its taper accurately centers the work.—H. J. Gerber, Stillwater, Okla.

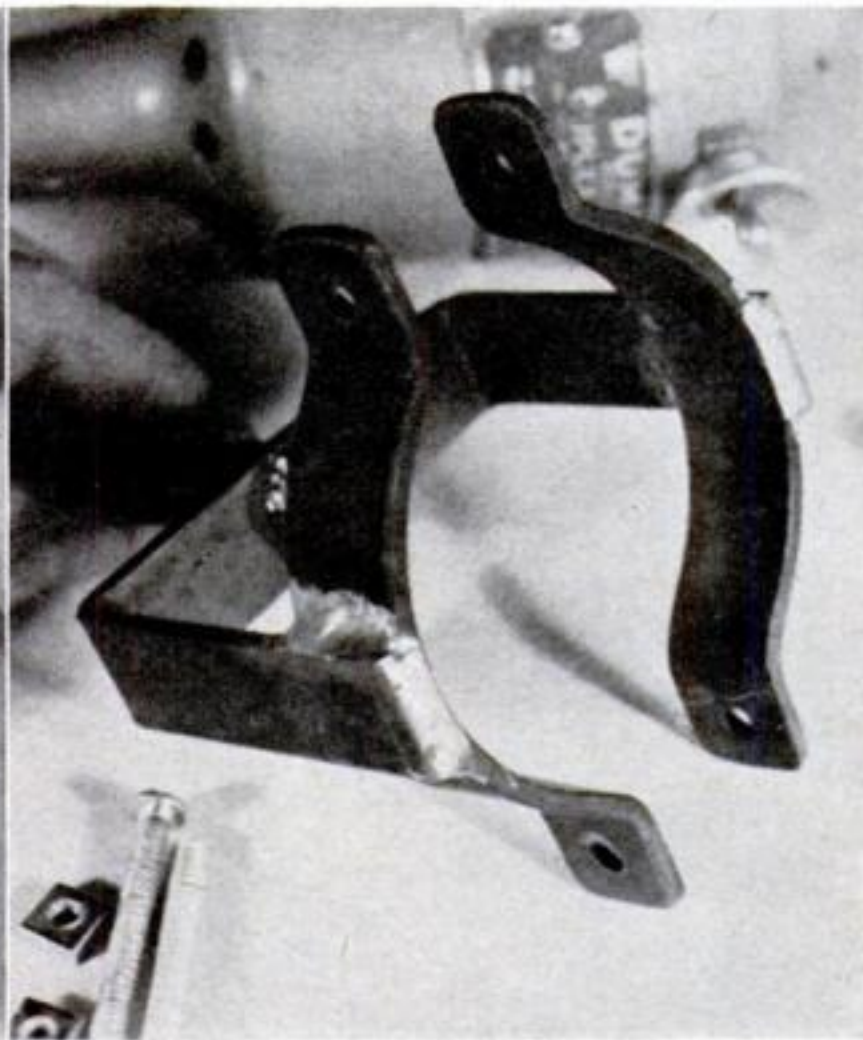
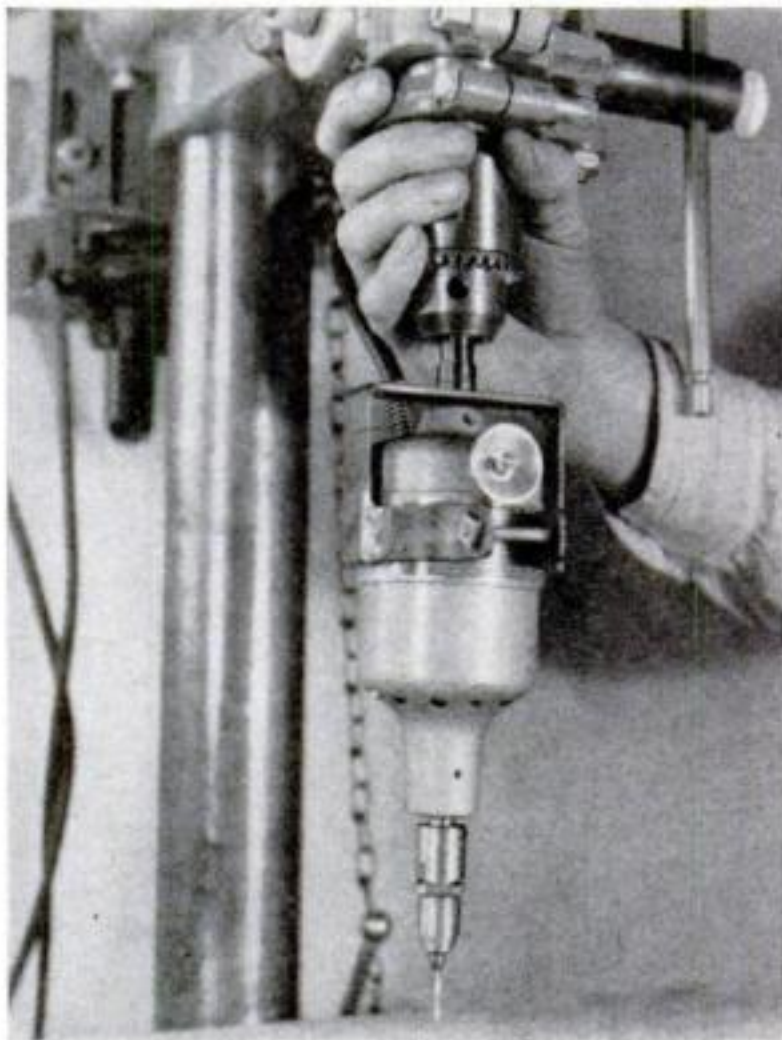
## *Grinder Used in Drill Press*

Clamped in a drill press, a small, high-speed grinder is ideal for drilling small holes. You gain exact alignment and the convenience of a quill feed.

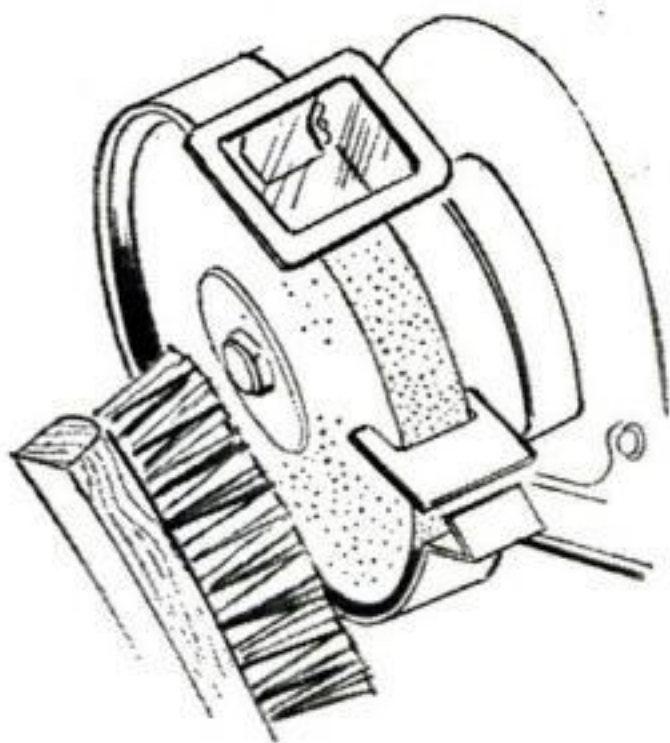
A mounting bracket can be bent cold from  $\frac{1}{8}$ "-by- $\frac{3}{4}$ " steel, with clamp arms curved slightly smaller than the grinder. Turn a shoulder on

a 2"-by- $\frac{1}{2}$ " steel rod and peen it over in a hole at the center of the bracket yoke; this shank is chucked in the drill press.

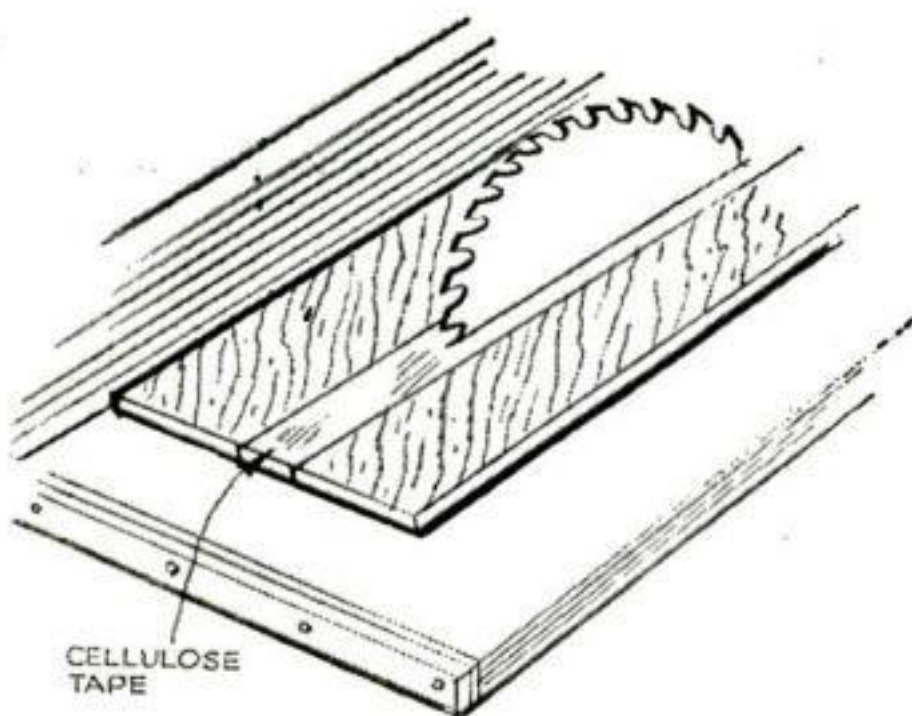
Before using the grinder, pull out the drill-press power cord for safety and C-clamp the V belt in its pulley to prevent unwanted movement.—C. C. Cooley, New Buffalo, Mich.





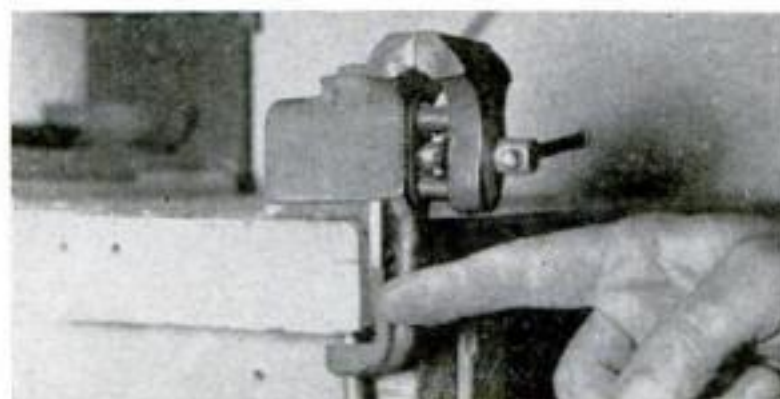


**Wire brushes lose their bite** when bristle ends become round from prolonged wear. You can restore the original shape by holding the bristles against the side of a grinding wheel.  
—*John A. Comstock, Wellsboro, Pa.*



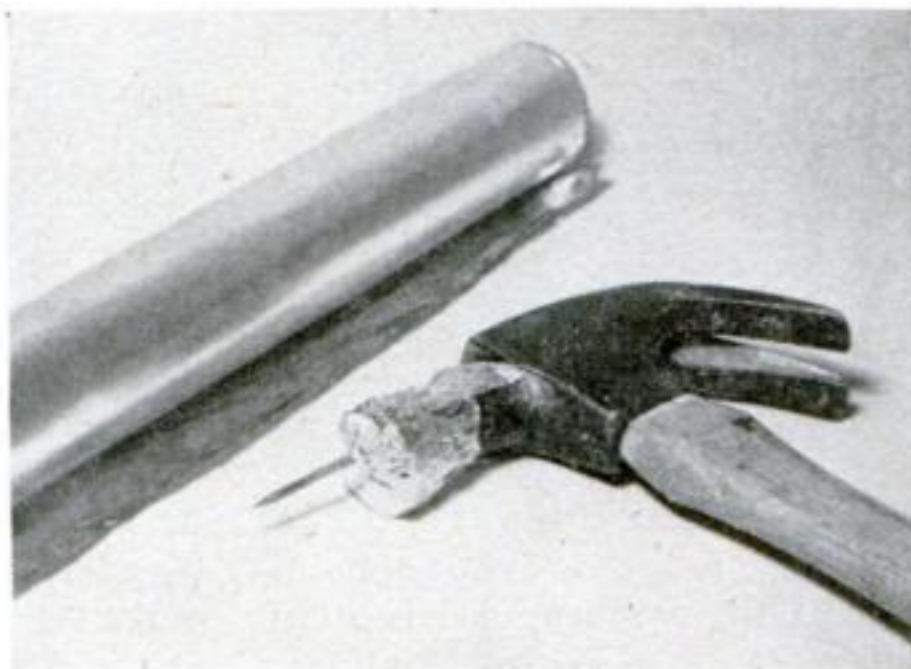
**Veneer won't splinter** when sawed, giving ragged edges, if you lay a strip of clear cellulose tape over the guide line. After making the cut, peel tape off gently with the grain.—*Frank Stockton, Miami, Fla.*

**Cutting the front board** of a workbench top a few inches longer than the others provides a protruding lip for attaching a small vise. This will leave the main working area clear.—*Harry Webster, Nutley, N. J.*



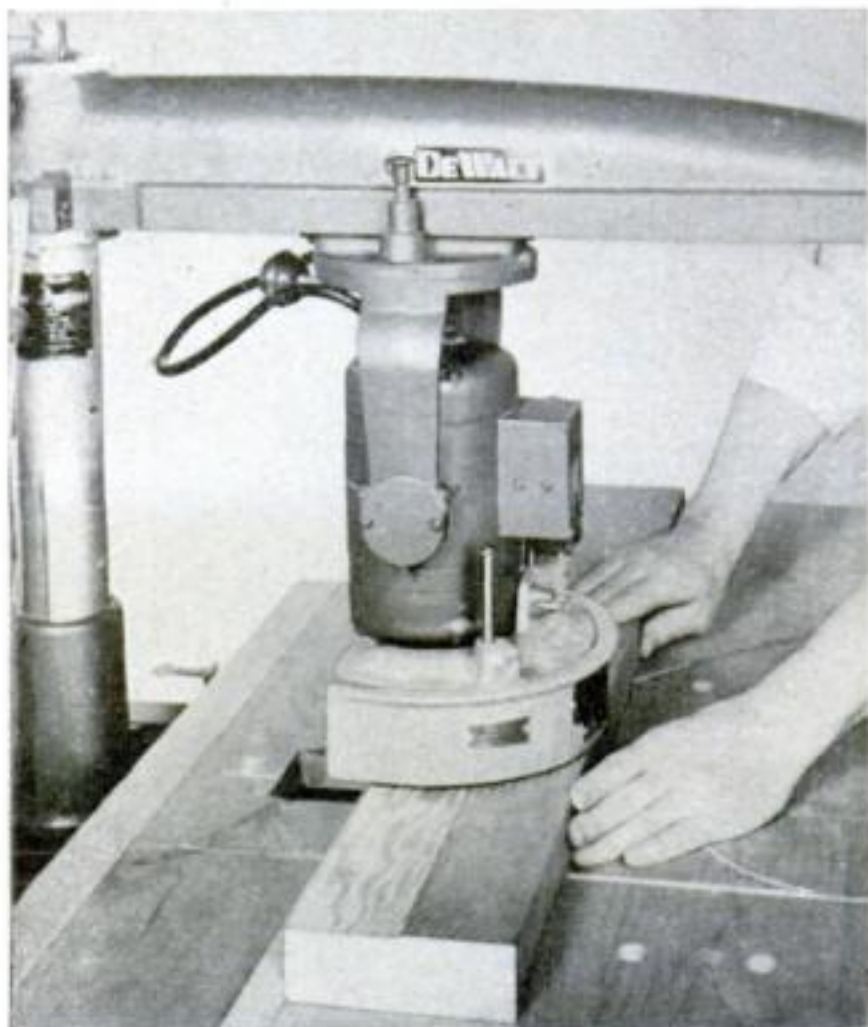
## HAVE YOU TRIED THIS?

**Aluminum foil** will hold a nail on a hammer while you start it in a hard-to-reach place. Make the first blow hard enough to start the nail, then pull the hammer away, tearing the foil off the head. Remove scraps of foil from the nail.—*A. J. Clemson, Chicago.*

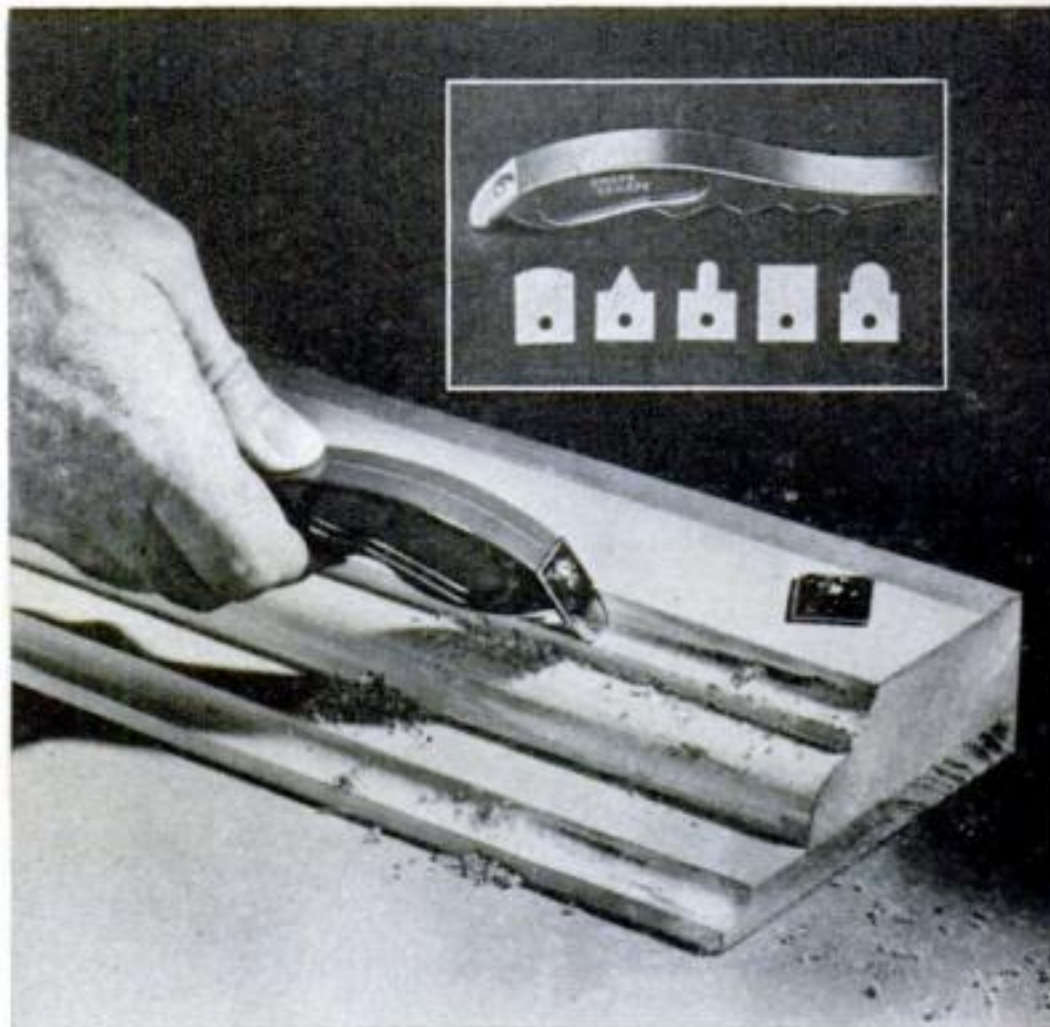




# New Tools



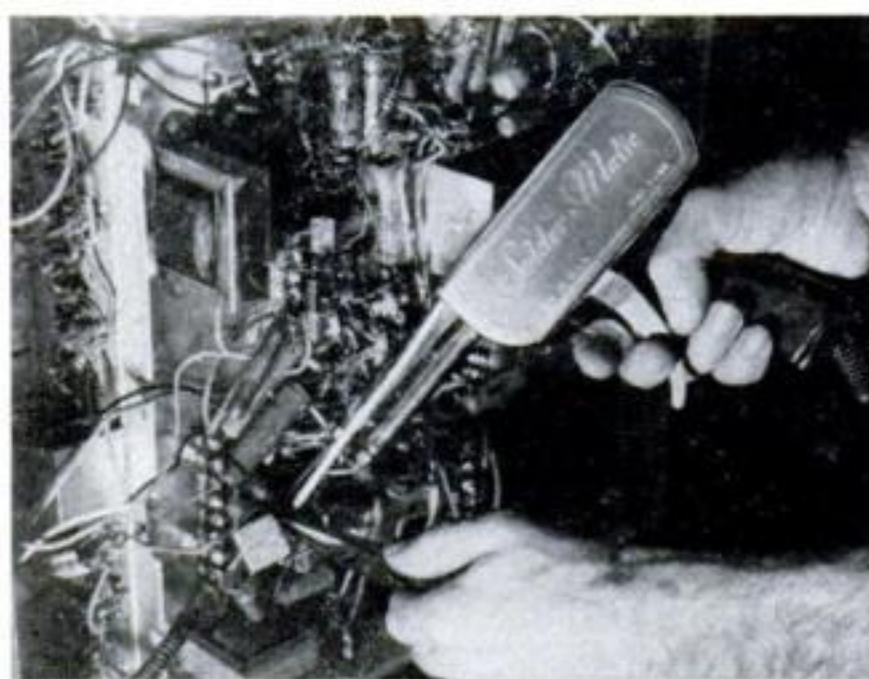
**1. Guard for Radial-Arm Tools.** Used with the drive shaft vertical or nearly vertical, this safety device will keep your hands away from the cutting tool. It supplements the standard horizontal-drive guard and can be used with a saw blade, shaper head, rotary surfacer (as above), sanding disk or other accessory.



**2. Scraper Gets into Corners.** A new contour scraper, for moldings, picture frames, furniture and the like, has interchangeable blades that allow you to remove paint from compound contours without gouging. Besides the blunted-angle blade being used above, the kit contains five other shapes, as shown in the inset.

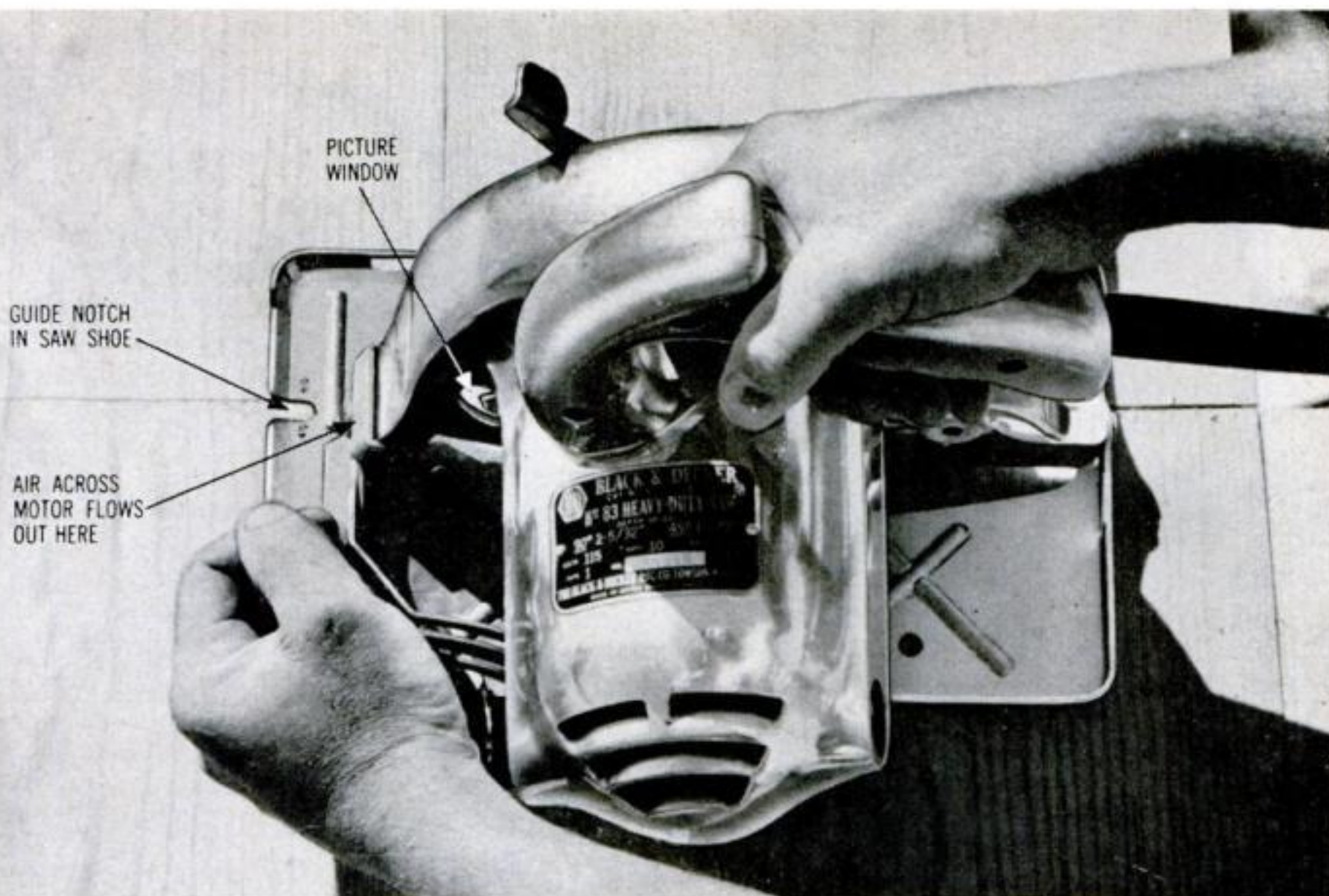


**3. Sanding Block Uses Rolls.** Here is a man-size sanding block that takes rolls of sandpaper. You lift a clamp to insert a roll in the body, press it back into place, and use as a conventional sanding block. Extra 100' rolls, in several grit sizes, are available. Or you can use strips cut from regular sandpaper sheets.



**4. Gun Attachment Feeds Solder.** A unit that can be attached to most popular makes of electric soldering guns will permit you to feed solder to the work automatically by pressure on the trigger. Unwinding solder from a spool, it keeps the end at the tip of the gun and leaves one of your hands free to handle the work.



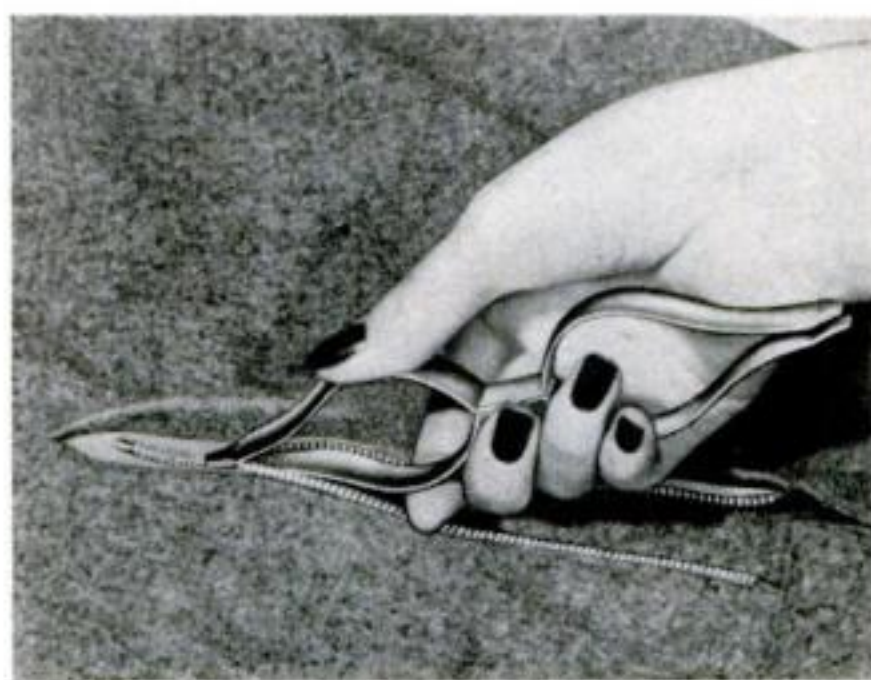


**5. Window in Saw Guides Cut.** This redesigned portable electric saw now incorporates a "picture window" built into the blade guard that gives you a sawdust-free view at any angle. It also has two guide notches in the shoe to provide a continuous check of cutting alignment and a special motor, cooled by a fan, that blows

dust away from the operator and the line of sight. To speed cutting, power of this model has been increased 25 percent over previous models. Safety features retained from earlier versions include a switch guard to prevent accidental tripping, a telescoping blade guard and a three-conductor cable for grounding.



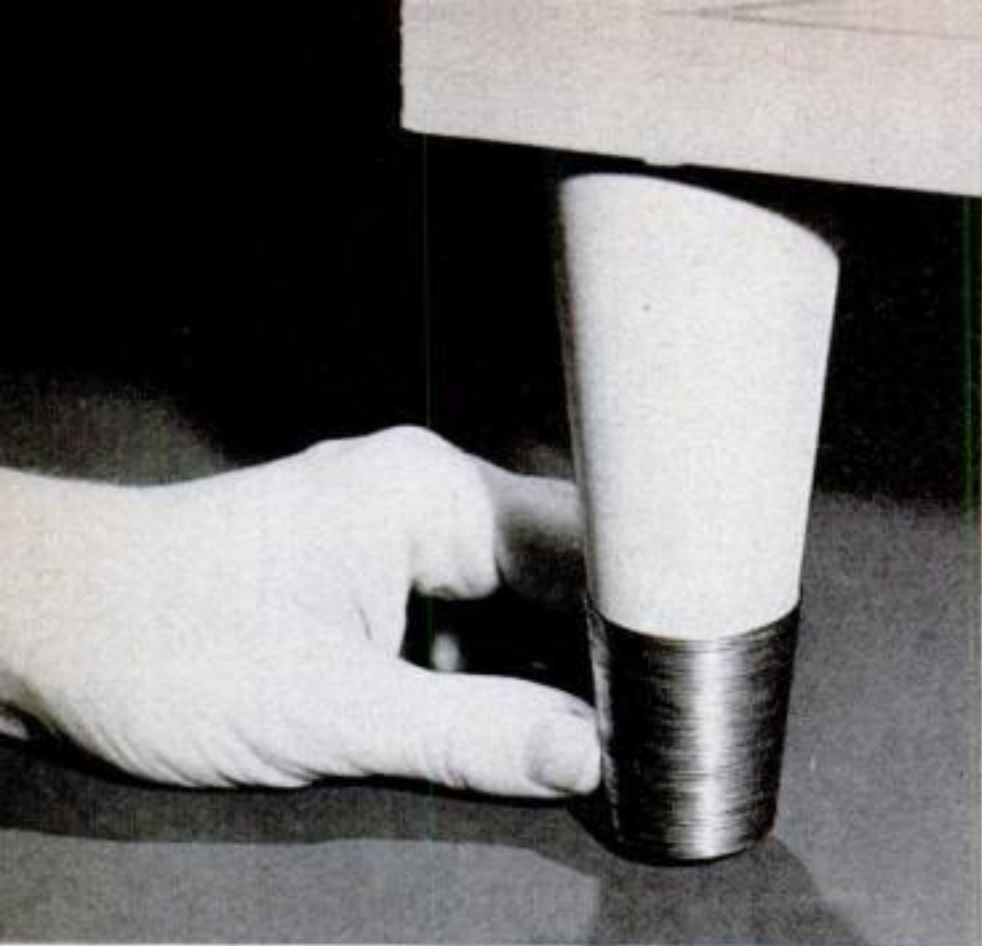
**6. Plug Lock Guards Power Tools.** A protector that fits over one prong of a cord plug prevents use of a power tool in your absence. You lock it in place with a key you can carry on a key chain.



**7. Device Mends Slide Fasteners.** This springlike tool remeshes the grips of a fastener that has worked loose below the slide. With it you get two replacement slides for use if the old one is broken.

**More information** about the new tools shown on this and the preceding page can be obtained from: 1. DeWalt, Inc., Lancaster, Pa.; 2. Meridian Products Co., 366 Madison Ave., NYC 17; 3. Behr-Manning Division, Troy, N.Y.; 4. Atlas Mfg. Co., Inc., 1126 S. Decatur St., Montgomery 6, Ala.; 5. Black & Decker Mfg. Co., Towson 4, Md.; 6. Riverside Mfg. Co., Woodstock, Va.; 7. Damar Products Co., 125 Damar Bldg., Newark 5, N.J.





**A NEAT METAL FERRULE** can be provided on furniture legs by winding the ends with brass, copper or aluminum wire. Start at the bottom, anchoring the wire under a glide. Secure the top end in a small hole or under a tack in the back of the leg. Shellac or lacquer will preserve the metal's gleam.

## 3 Dressy Feet for Craft Projects



**WOODEN DOOR STOPS** can be used as legs for small dresser or chest projects. They come in a variety of shapes and sizes. Cost? About a dime apiece. The rubber bumper tips serve as cushion feet.

**USE LIPSTICK CAPS** as ready-made ferrules on slim-legged projects. If necessary, turn the legs a little so the brass caps are a press fit.



# How to Put

By William B. Eagan

**T**HE old RFD mailbox has come to town. In many housing developments, mailmen are now delivering to rural-type boxes from a truck or car. And more and more people are building isolated homes along country roads.

It may pay you, therefore, to know the approved way of installing a mailbox on a post.

The Post Office recommends that you use the inexpensive metal box available at hardware stores, although it does permit homemade boxes if they are simple in design, waterproof, and otherwise meet regulations.

**Locating the box.** The box must be located so that the mail carrier can insert and remove mail without leaving his car. Since road shoulders vary in height and width, the best way to determine the correct position is to drive your car within 6" of the road edge, then extend your arm from the right-hand window.

Have a helper drop a plumb bob from your wrist to the ground. This will mark the location of the front of the box. The bottom of the box should be level with the bottom of the car window.

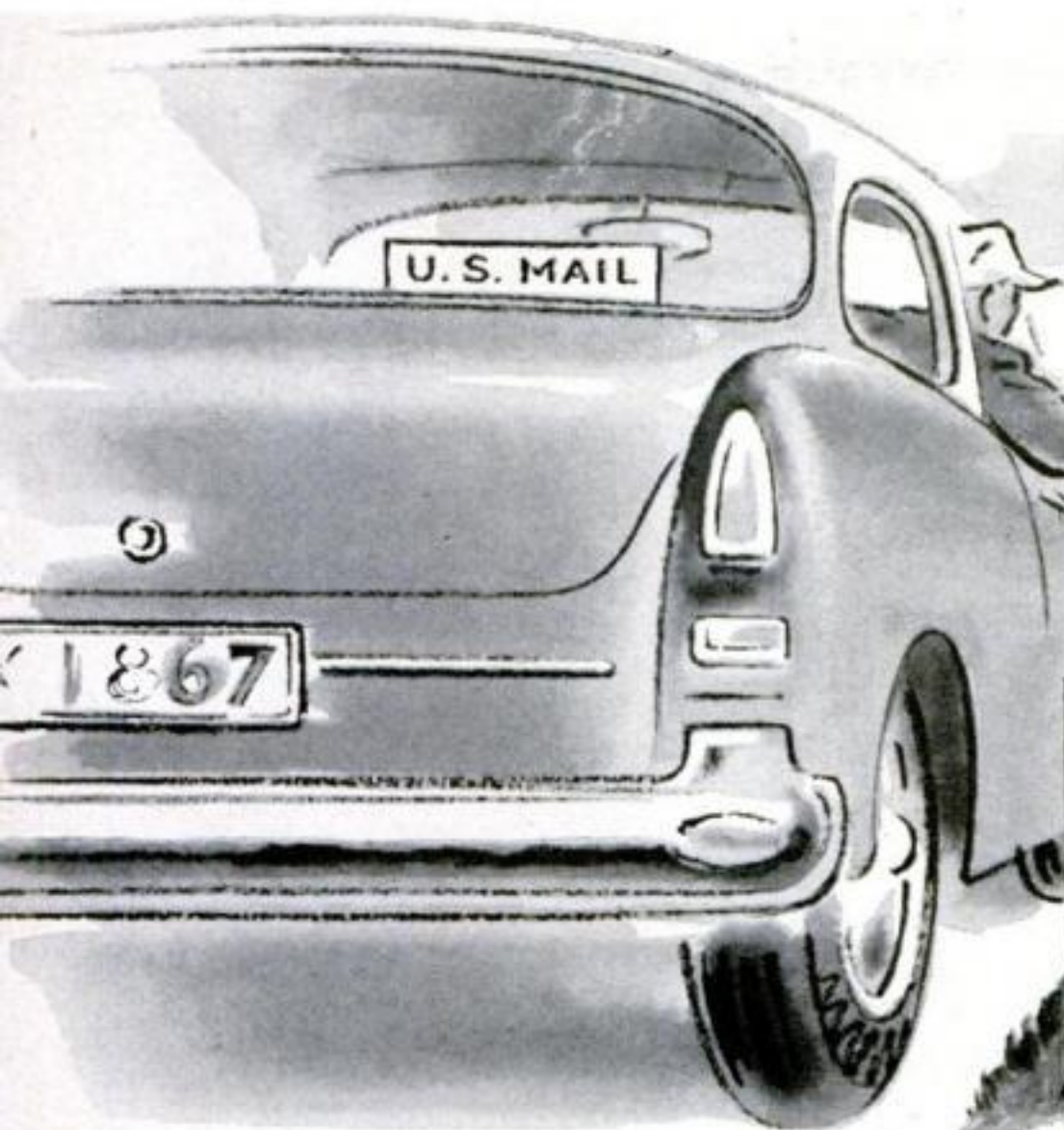
By placing the box on the ground and measuring from its front to the middle, you can then mark where the supporting post will go. If this falls inside a drainage ditch, it's best to set the post farther back and mount the box on an extension arm. Otherwise, water may quickly rot, rust or undermine the post.

If you can't place the box so that it can be reached directly from the road, it's recommended that you provide a gravel pull-off for the postman's car. In most areas, the box must also be located on the right-hand side of the road in the direction of the mail carrier's travel. On one-way routes, this may mean placing your box on the opposite side of the street, so be sure to find out the requirements in your area.

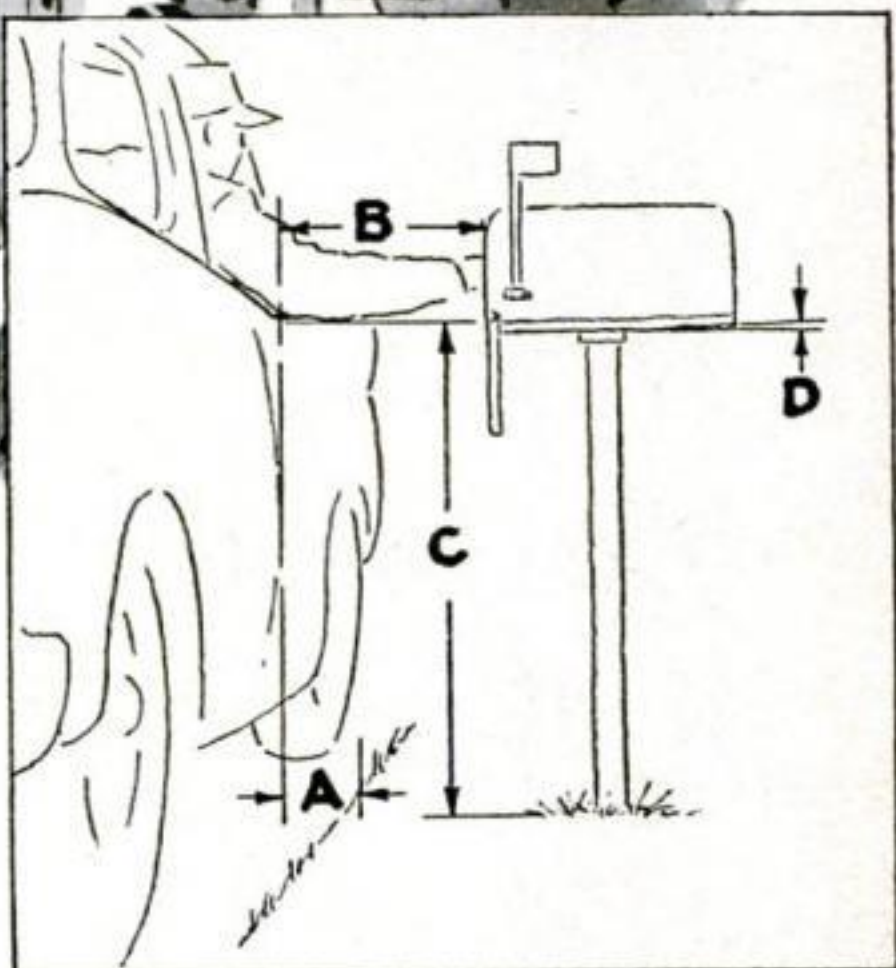
**How to install the post.** You won't have to keep replacing a leaning or fallen mailbox if you embed the support firmly in concrete. Dig the hole so that it flares out at the bottom, providing a broad,



# Up a Rural Mailbox



**CORRECT MAILBOX LOCATION** is found by parking car about 6" from edge of road, as at A. Distance B, to extended wrist, then marks front of box. Distance C, with bottom of box level with bottom of car window, indicates proper height. Tilt box  $\frac{1}{4}$ ", as at D, to shed rain.



heavy anchor. The base of the post should pass right through the concrete and rest on a rock or bed of gravel to give good drainage.

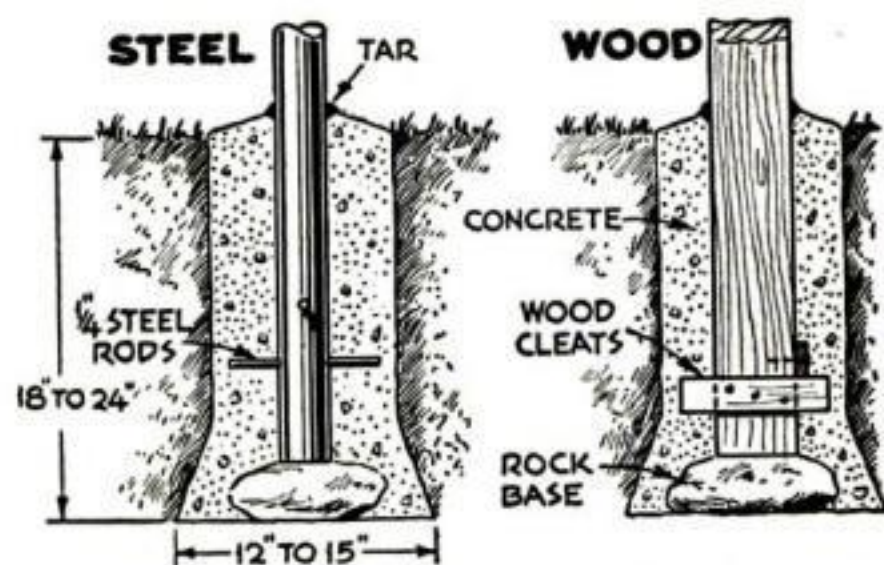
Metal posts, made of pipe or steel angle, are more durable than wood—unless they're clipped by a wayward motorist or snowplow. Then they're harder and more expensive to replace.

The most popular support is a wood four-by-four, sunk in the ground  $1\frac{1}{2}$ ' to 2'. For a more rustic effect, you can use a straight log about 4" in diameter, left unpainted. To minimize rot, coat the base of any wood post with tar or creosote before embedding in concrete. Metal posts can be coated with a rust-retarding paint.

Be wary of fancy or overly ornate supports.

"Supports shall not be in the form of effigies or forms intended to represent figures or mechanical objects of any kind

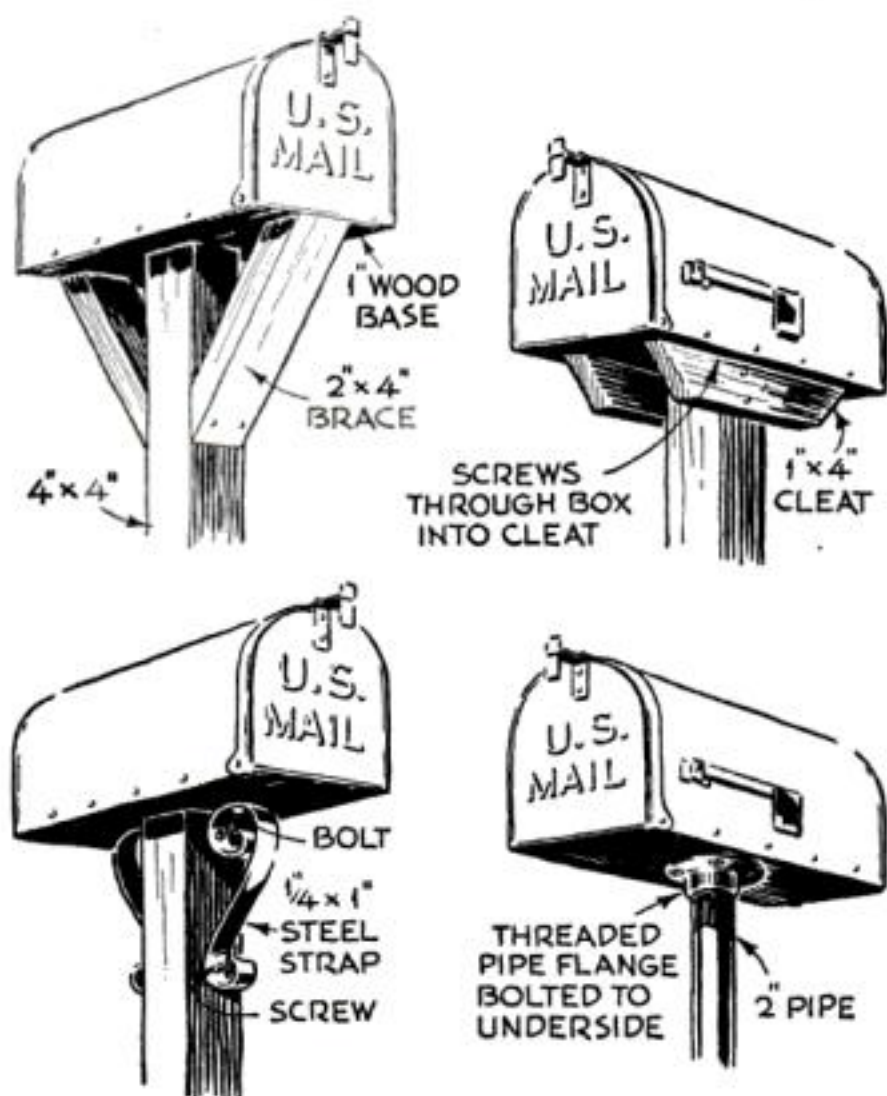
## How to anchor the post in the ground



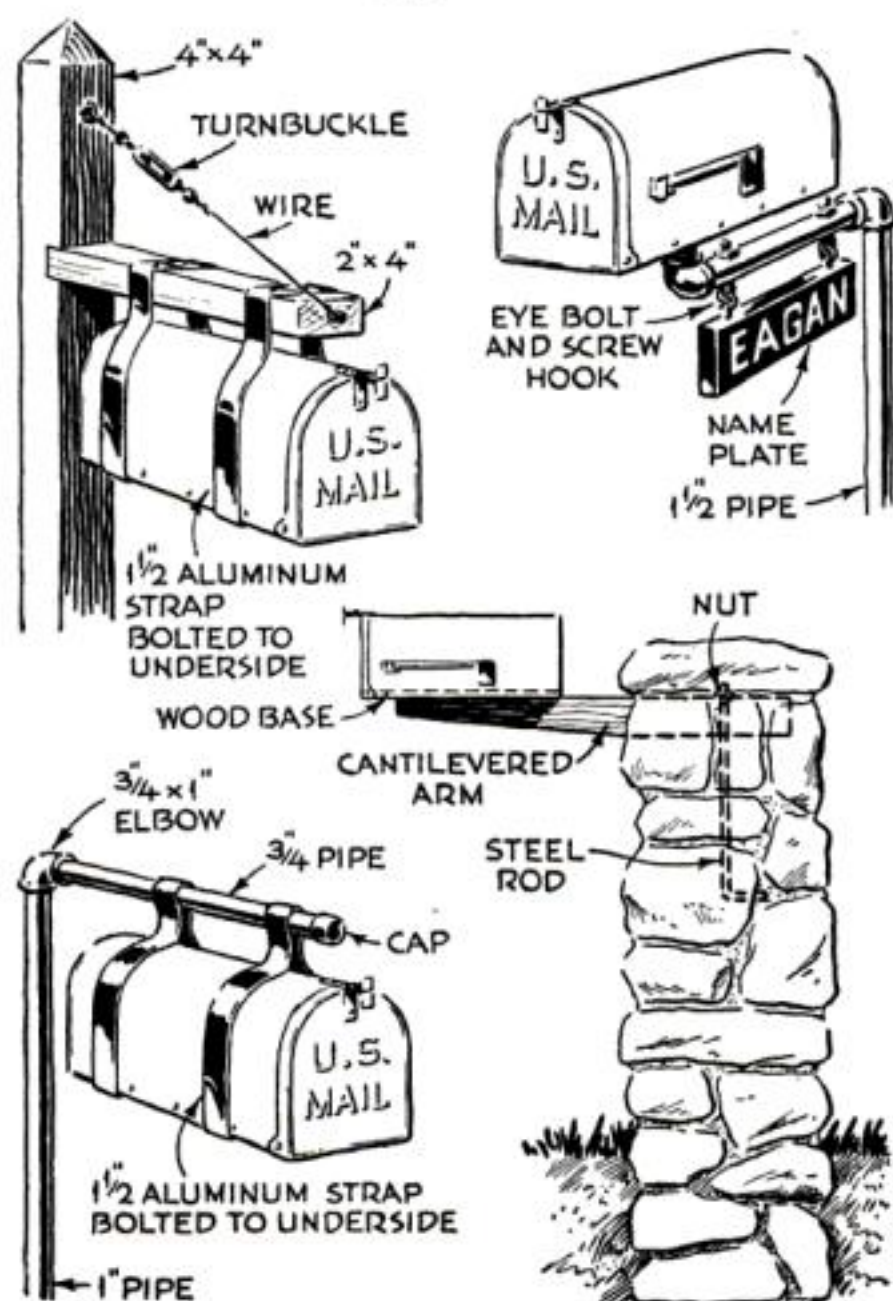
**CONCRETE ANCHOR**, flared out at bottom, won't tip. Cleats nailed to a wood post, or steel rods through a metal one, lock the base tightly in. Slope concrete away from the post at top to drain water, and seal the crack with tar.



## Four ways to fasten the box to the post



## Four ways to make decorative supports



and shall contain no advertising," says a statement of policy from the Post Office Department.

That rules out the jigsawed figures of Uncle Sam that you sometimes see holding up rural boxes.

**How to attach the box.** The simplest way is with a small 1"-thick shelf that fits into a recess on the underside of the standard metal box. The shelf can be nailed or screwed to a wood post or fastened to pipe with a threaded floor flange. Several styles of braces can then be added for extra strength and a touch of decoration.

You can also suspend your box from an arm, combine it with a post lamp, or mount it atop a built-up pier of fieldstone. Extra brackets can be added to hold a nameplate, house number or a second box for newspaper delivery.

Whatever style you choose, be sure to make all attachments to the bottom of the box to prevent leaks. The box should also tilt slightly forward—about 1/4"—to keep rain from running back into it.

Where a number of boxes must be put up at a side road or entrance to a development, it's best to group them on a single support. This not only saves the postman's time, but makes a neater-looking arrangement. The same rules of height and position apply here as for a single mailbox. A multiple support can be made by installing posts 3' to 4' apart and mounting the boxes on a cross rail on top.

The Post Office would like its boxes white for better visibility, but doesn't insist on it. You can paint the box and support either matching or contrasting colors as you wish.

To make the post show up better at night, you can fasten on bicycle reflectors. Remember to oil the door hinge and flag once in a while to prevent rust. **END**

**Save it now for future help**—you never know when you might have to make repairs on window screens.

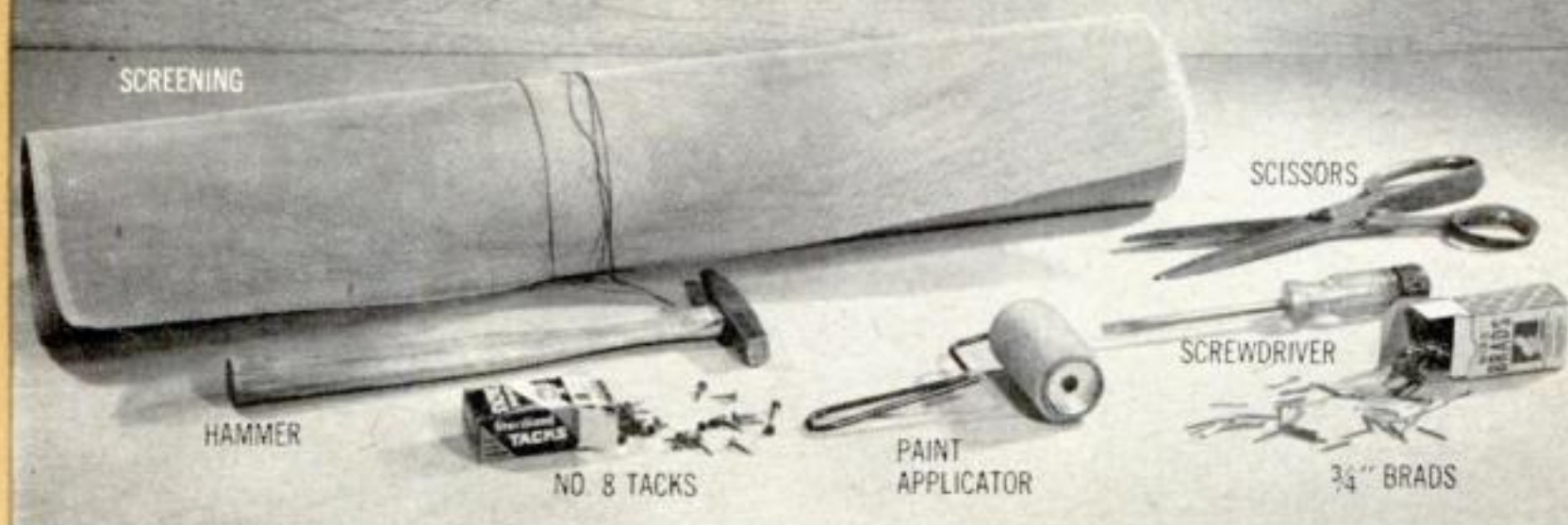
One of a series of handy, tear-out reference sheets, this new entry for the POPULAR SCIENCE Fix-It File can be kept in either a ring or spring-clip binder. That way you'll soon have your personal book of home repairs.

**Next Month:** Sash cords.



# Popular Science Fix-It File

## THE MATERIALS AND TOOLS YOU NEED



## How to paint screens



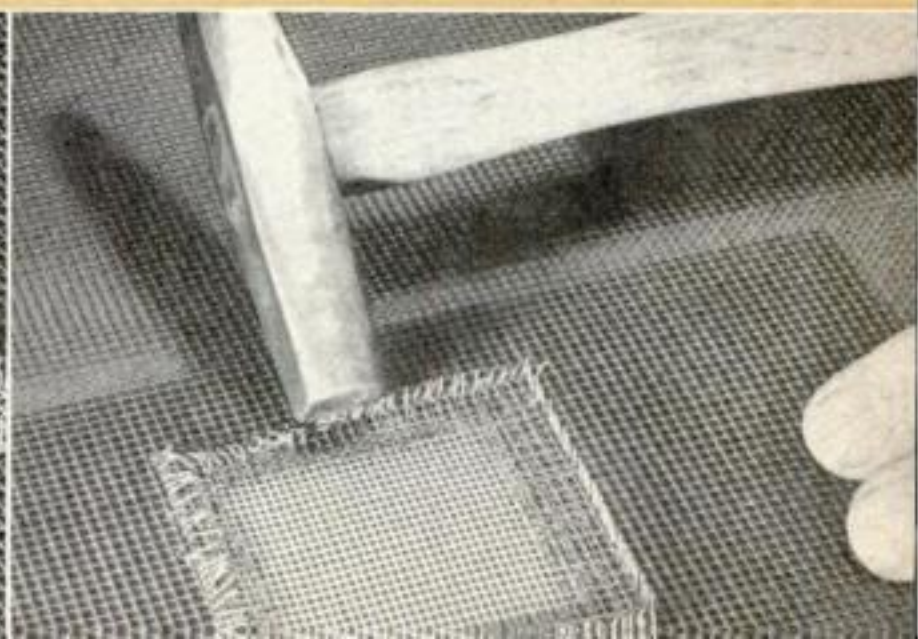
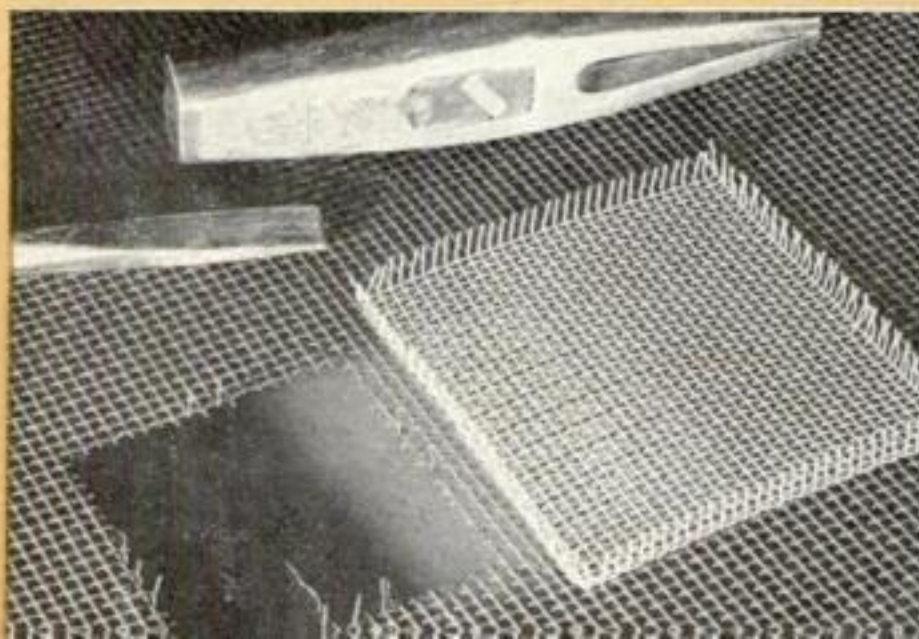
**TO PREVENT RUST**, apply thinned screen paint once a year to black-painted steel screening, every two years to galvanized. Use a roller or felt applicator. Apply spar varnish each season to bronze and copper screens (paint

won't stick to them) to prevent stains below windows. Aluminum, stainless steel, and plastic screening need no paint. To paint frames, hold them at a non-stoop level by C-clamping two supports to the sides of a stepladder.

## How to put on a patch

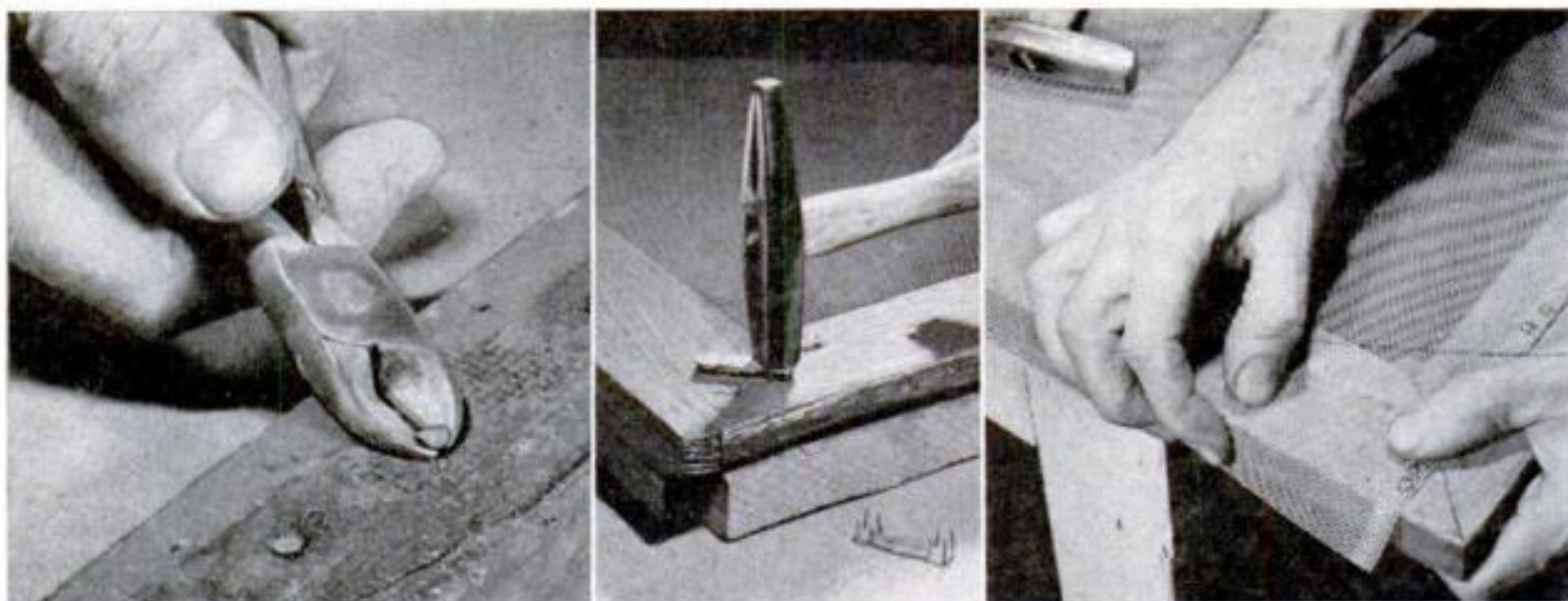
**TRIM THE HOLE** to square or rectangular shape. Bend a few wires outward along each side as shown, so the edges of opening can be anchored to the patch. Cut patch  $1\frac{1}{2}$ " larger each way than opening, pull wires from the

edges so that  $\frac{1}{2}$ " of remaining wire ends can be bent at right angles. Put patch over opening and force wire through mesh. Clinch ends projecting from hole edges. Then turn screen over and hammer inward all ends of patch wires.



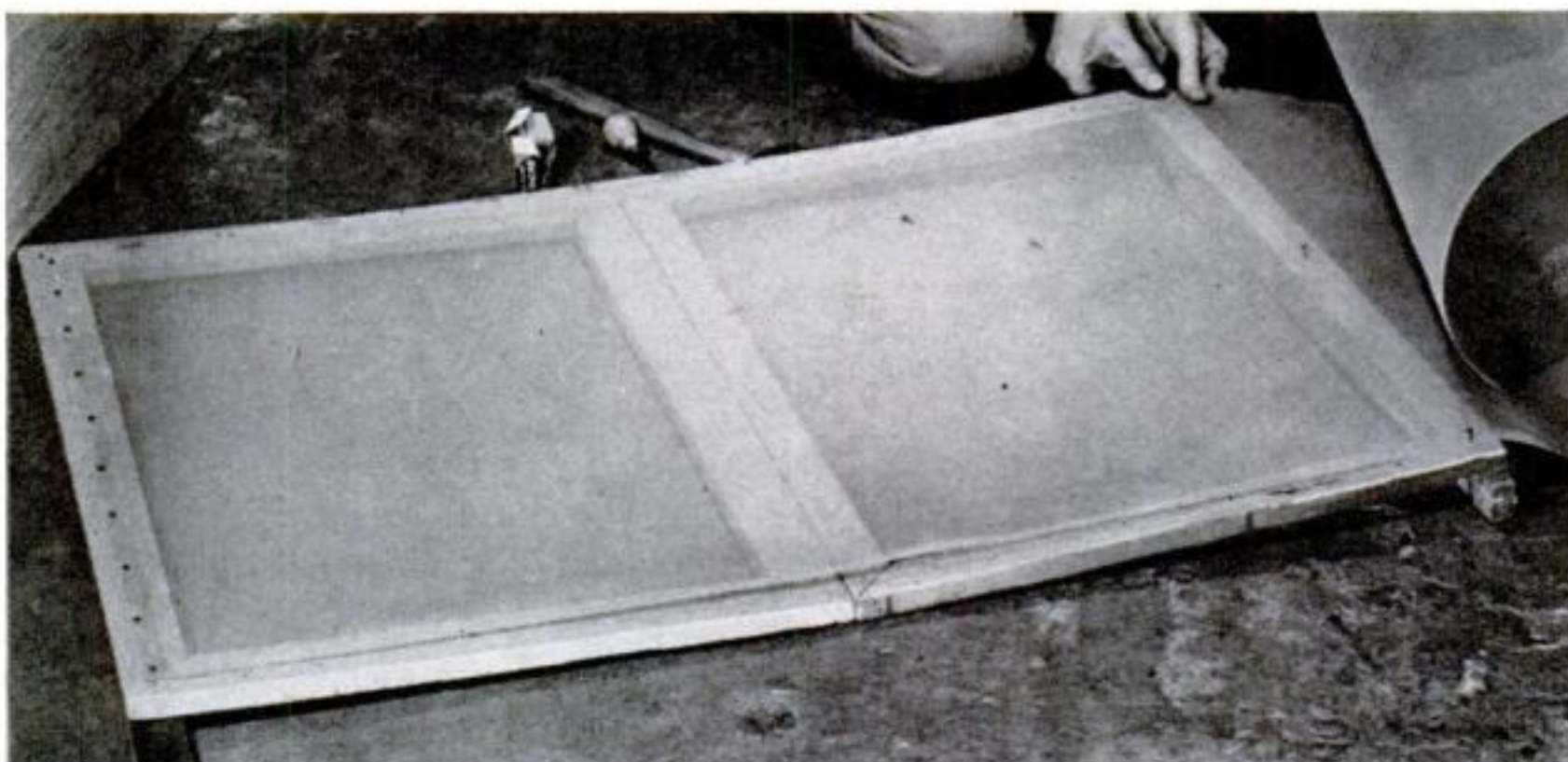


## How to put on new screening



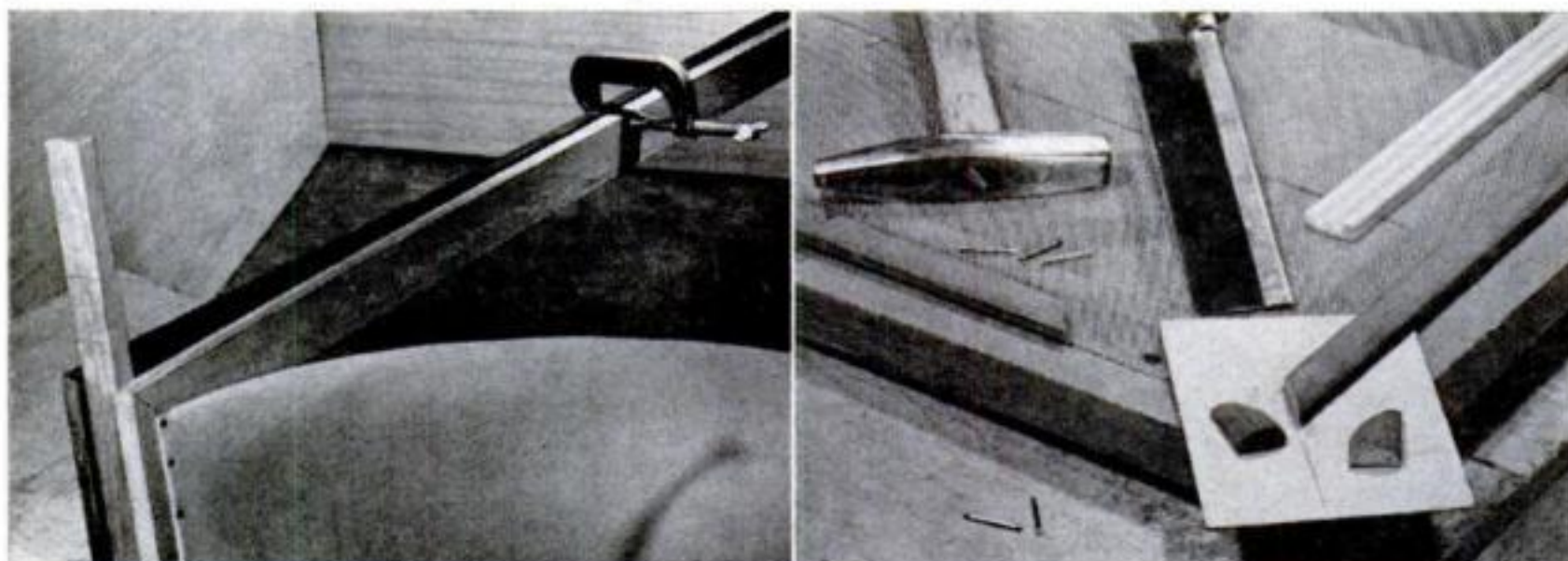
**REMOVE THE OLD** by prying out tacks after taking off the molding. Deep-set tacks can be lifted with diagonal-cutting pliers. (Now is a good time to paint frame and strengthen the joints as shown.) Cut the new screening to the proper length and width so that its edges

will lap the insides of the frame about  $\frac{3}{4}$ ". Also allow an extra  $\frac{3}{4}$ " all around to fold under. Use the edge of frame as a guide (above, right) in bending the edges. Complete each fold, hammer it flat, center the screening, and tack down one end every 2".



**TO STRETCH THE SCREENING**, you can place two screens end to end with opposite ends elevated. Tack the screening at the elevated ends, remove the elevating strips, press the frames flat, finish tacking and cut apart. To

prevent electrolytic action, select tacks carefully—copper for bronze and stainless-steel screens (and brass brads for the molding); steel tacks for steel screens, and aluminum screens if you can't get aluminum tacks.

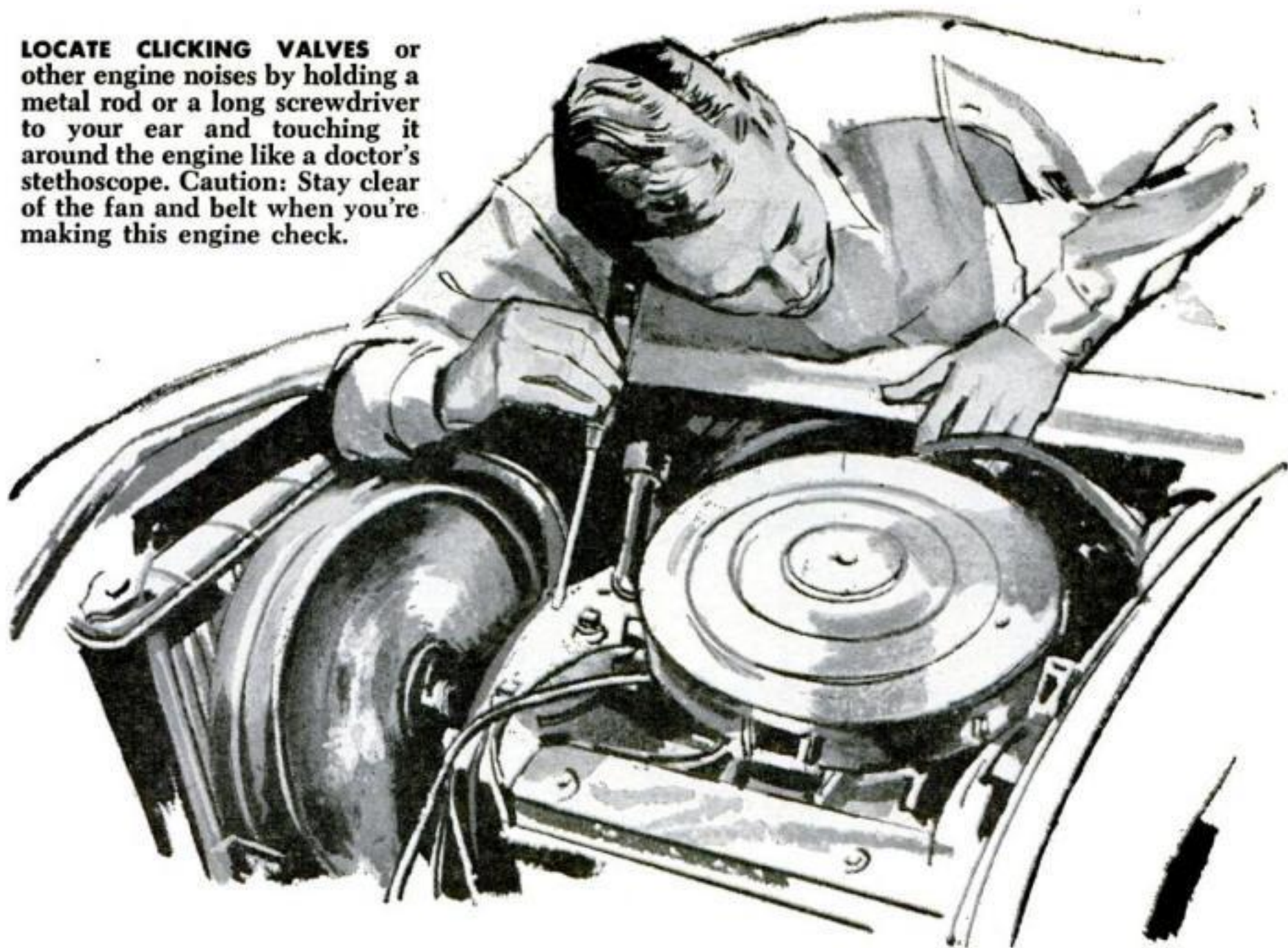


**IDENTICAL FRAMES CAN BE BOWED** like this to stretch screening. Clamp together at midpoint after placing 1" strips between ends. Tack screening at ends, remove the strips.

**FINISH THE JOB** by applying molding over the edges of new screening. Two types of molding are available, flat and half-round. Miter the corners and brad the molding in place.



**LOCATE CLICKING VALVES** or other engine noises by holding a metal rod or a long screwdriver to your ear and touching it around the engine like a doctor's stethoscope. Caution: Stay clear of the fan and belt when you're making this engine check.



*When you buy a new car, here's how to get—*

# Full Value from That 1,000-Mile Checkup

**By Herbert R. Pfister**

**T**HE service certificate that comes with a new car is not a gift. You pay for it in the price of the car. It entitles you to a thorough checkup and adjustment after the break-in period, and also to the replacement of any defective parts.

It's a mistake to feel reluctant, as some drivers do, about insisting on a careful examination. It's a worse mistake to skip the checkup entirely, just because your new car is running fine when the break-in period ends.

On page 173 is a list of things you should check before you see your dealer. It will help you record any flaws in your car so that you can bring them to his at-

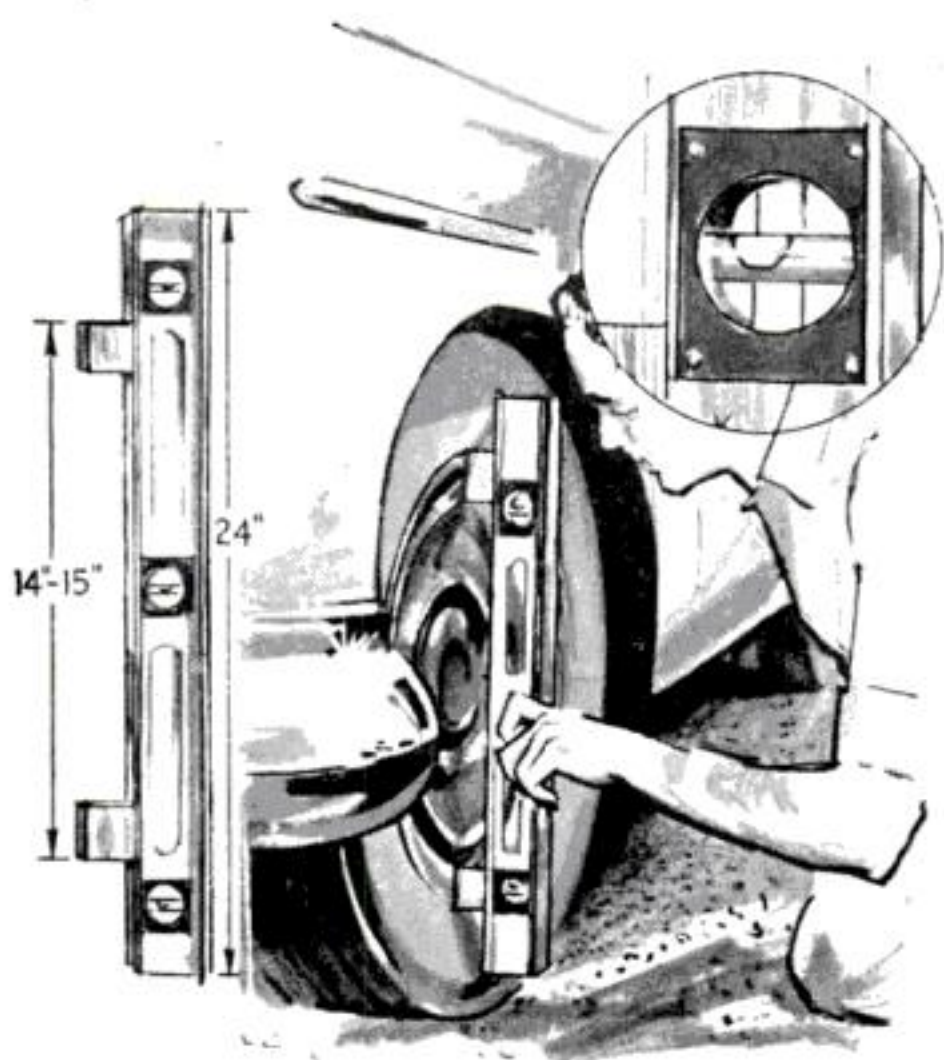
tention, and later make sure he has fixed them. Besides these, your dealer has his own list of things to do. It generally includes:

- Road test. This is usually brief; a good mechanic can tell a lot about a car in five minutes.
- Wheel alignment if needed.
- Engine tune-up, including setting mechanical tappets, if any.
- Adjust automatic transmission if necessary.
- Grease job. Oil change. Check all fluid levels.

All this is commonly called a 1,000-mile checkup, though it may be due at 1,000, 1,500 or 2,000 miles, depending on the make of your car.

If serious trouble comes, see your deal-





**DO WHEELS NEED ALIGNING?** You can tell by checking them with a carpenter's level. Cement two identical blocks of wood to the level, spacing them so that they touch opposite sides of the wheel's rim but not the tire. With the car on level ground, hold the level vertically against each wheel. Unless the bubble shows that they lean slightly outward at the top (as in inset above), put a wheel-alignment job on your checkup list. Recheck later to see the difference.

er at once. Report immediately, too, any performance troubles in engine, transmission, brakes, lights, horn, wipers—or trouble with anything that concerns your safety, as, for example, a hood latch that won't work right.

**What can wait for the checkup?** Try to defer work on body rattles or squealing brakes—two of the most common complaints. Dealers know (but sometimes have trouble convincing owners) that rattles often disappear by checkup time. Brakes lose their squeal when high spots wear down. Remember, too, that your dealer is only human. You'll get better service if you don't keep running to him with small fix-it jobs.

Poorly matched body parts or paint can wait, and so can handling stiffness. Even wheel alignment, unless very bad, can be deferred. Dealers say that it is hard to align wheels today before the springs have "set." Handling stiffness is natural in a new car; if it doesn't disappear by checkup time, ask your dealer to find out why.

You may find at the checkup that your dealer will ask you to continue driving your car beyond the warranty period to "wear in" parts that may be causing hum or rattle. When this happens, some owners become suspicious and accuse the dealer of trying to get off the warranty hook. These owners have read the fine print that says the warranty expires after, say, 4,000 miles or 90 days. Actually, a legitimate complaint about a defective part will usually be taken care of at any time.

**The dealer's responsibility.** This begins even before he delivers your car. He, and not the factory, is responsible for putting it in top condition.

Like a pilot checking a plane before takeoff, he goes over your car with a yard-long check list: grease car; check fluids; tighten dozens of important nuts to specified torque; check all linkages; gap the distributor points and time the engine; adjust carburetor; check headlight aim, wheel alignment and accessories; adjust body fit if necessary, and install hubcaps and floor mats. Then road-test the car and wash it.

All this has been done (or should have been) when you get your car. Your dealer's second obligation, then, is to check your car after break-in, to make adjustments and replace any defective parts.

**What you owe yourself.** 1. Study your manual. Because we've owned cars before, a lot of us fail to do this. But manuals change. 2. Watch the car carefully during the first 1,000 miles, especially oil and water levels, and the engine temperature. Don't ever let it overheat. 3. Keep calm. The first weeks are a time of heightened owner emotion. Don't let an unexpected "bug" throw you.

**What about bugs?** New design sometimes brings a faulty part. Your dealer is authorized only to replace the bad part with an identical one until the factory corrects the design. Once the factory has done this, complaints about the part will be corrected free, regardless of the age of your car. For this you can thank today's keen competition.

To get your money's worth at checkup time, check your car first against the questionnaire that follows. If your answer is NO to any of the questions, take the list with you at checkup time and huddle with the service manager.



# 27 Check Points for a 1,000-Mile Checkup

Rip out this sheet and use it as a guide in making your own check before going to the dealer's shop

## EQUIPMENT

**1 DID YOU GET ALL YOU PAID FOR?** YES ☐ NO ☐  
Check the optional equipment against the car invoice.

**2 DO THE ACCESSORIES OPERATE?** YES ☐ NO ☐  
Try all power assists and accessories, including standard equipment.

## BODY

**3 DO THE BODY CONTOURS MATCH?** YES ☐ NO ☐  
Inspect all meeting joints, especially where the doors blend with the fenders. Curves should match and lines flow smoothly from panel to panel.

**4 DOES BODY COLOR MATCH ALL OVER?** YES ☐ NO ☐  
Fenders, doors and deck lids are painted separately before assembly. See that the color is uniform on all parts.

**5 DO DOOR LOCKS WORK EASILY?** YES ☐ NO ☐  
Open and close the doors to see. Notice whether the door shifts up or down when it contacts the striker plate.

**6 DO HOOD AND DECK LIDS CLOSE EVENLY?** YES ☐ NO ☐  
They should fit evenly in the openings. You shouldn't have to slam them to make them lock.

## ELECTRICAL

**7 ARE THE HEADLIGHTS PROPERLY AIMED?** YES ☐ NO ☐  
You can make a spot check as you drive up to your garage. Notice the bright spots on the door. If one is higher than the other, or if they seem to point to the left, have the aiming checked.

**8 DO THE STOPLIGHTS WORK PROPERLY?** YES ☐ NO ☐  
Work the brake pedal several times. The stoplights should go out the instant you release it. If they're sluggish, the switch is defective.

**9 DO INSTRUMENTS FUNCTION?** YES ☐ NO ☐  
The indicator lights on the dash marked Gen and Oil should go out when the engine is started. See if pointers on fuel and temperature gauge respond.

## FLUID LEVELS

**10 ARE THE OIL SEALS TIGHT?** YES ☐ NO ☐  
Keep a large piece of cardboard on the garage floor. Inspect it occasionally for drippings. If drippings seem heavy, check the oil more often than usual until you get to the dealer's garage.

**11 IS THE TRANSMISSION OIL-TIGHT?** YES ☐ NO ☐  
If drippings are toward the rear of the engine, drop samples from engine and transmission dipsticks on white blotting paper and note the color difference to see if the leak is in the transmission.

**12 DO BRAKE CYLINDERS STAY FILLED?** YES ☐ NO ☐  
Check the fluid level in the master cylinder. Inspect the inner side of wheels for signs of a leaky wheel cylinder.

## BRAKES

**13 ARE THE BRAKES OKAY?** YES ☐ NO ☐  
Do they pull the car to one side when applied? Does the pedal feel sufficiently high or is excessive pressure required to stop the car? Do the brakes grab?

[Please turn the page]



**14 DOES THE PARKING BRAKE HOLD?** YES NO  
☐ ☐

Set the parking brake when on a steep hill and see. If the car rolls forward, or if you feel you're pulling the hand lever too far out before the brakes take hold, the cables need adjustment.

**FRONT END**

**15 IS THE STEERING LINKAGE TIGHT?** YES NO  
☐ ☐

Jack up the car to inspect the tie rods. Look for looseness, nuts not drawn up tight or castellated nuts without the safety-locking cotter pins on the steering arm and tie-rod connections.

**16 DO THE FRONT WHEELS ROTATE EASILY?** YES NO  
☐ ☐

Jack up the front wheels and spin each wheel by hand. Clicking or grinding noises are an indication of trouble in the wheel bearings.

**17 ARE THE FRONT WHEELS ALIGNED?** YES NO  
☐ ☐

Check their camber with a carpenter's level. If they seem knock-kneed, they should be aligned.

**18 DOES THE CAR STEER EASILY?** YES NO  
☐ ☐

On a straight road, the steering wheel should be centered. It should return to straight-ahead by itself after a turn, whether the car is equipped with plain or power steering.

**ENGINE**

**19 IS THE ENGINE QUIET?** YES NO  
☐ ☐

A new engine with mechanical valve lifters will normally be noisy until adjusted. If your car has hydraulic lifters, they should be quiet from the start.

**20 ARE CYLINDER-HEAD GASKETS TIGHT?** YES NO  
☐ ☐

If there are traces of rust along the thin line where cylinder head joins engine block, a new head gasket should be installed, or the head bolts torqued.

**21 DOES THE CAR ACCELERATE WELL?** YES NO  
☐ ☐

Just before the checkup, try a few fast

getaways and open the throttle as wide as road conditions and the legal speed limit will allow. Look for flat spots or hesitation during acceleration; listen and "feel" for skips and misses at high speeds or when going uphill.

**TRANSMISSION**

**22 IS THE AUTOMATIC TRANSMISSION SMOOTH?** YES NO  
☐ ☐

Move the selector lever through all positions while the engine idles. Faint purring noises are normal, but there should not be any thumps, jerks or evidence of hard engagement. Move the car back and forth in Low and Reverse to see if the transmission chatters or grabs.

**23 CAN THE CAR BE PUSH-STARTED?** YES NO  
☐ ☐

Move the selector to Neutral and shut off the engine while coasting down a hill at 25 m.p.h. Then try to push-start the engine according to instructions in the owner's manual.

**24 DOES THE TRANSMISSION HOLD IN "PARK"?** YES NO  
☐ ☐

Stop the car on a hill and move the selector to Park. Then release the brake. The transmission should be able to hold the car without the brake.

**25 DOES THE KICK-DOWN SWITCH FUNCTION?** YES NO  
☐ ☐

Press the accelerator to the floor while driving at about 30 m.p.h. in Drive range. The car should instantly surge forward in the intermediate or passing range.

**NOISE LEVEL**

**26 IS THE RIDE QUIET ON ROUGH ROADS?** YES NO  
☐ ☐

Drive your car on a second-rate road and listen for heavy metallic rattles caused by loose shock absorbers and rear-spring fastenings. Body rattles are milder and sometimes harder to trace, but try to pinpoint them for the dealer.

**27 IS THE RIDE QUIET ON SMOOTH ROADS?** YES NO  
☐ ☐

On a smooth asphalt road, listen for gear noises, rumble or droning in the transmission, and the rhythmic thumping of a defective tire.

END



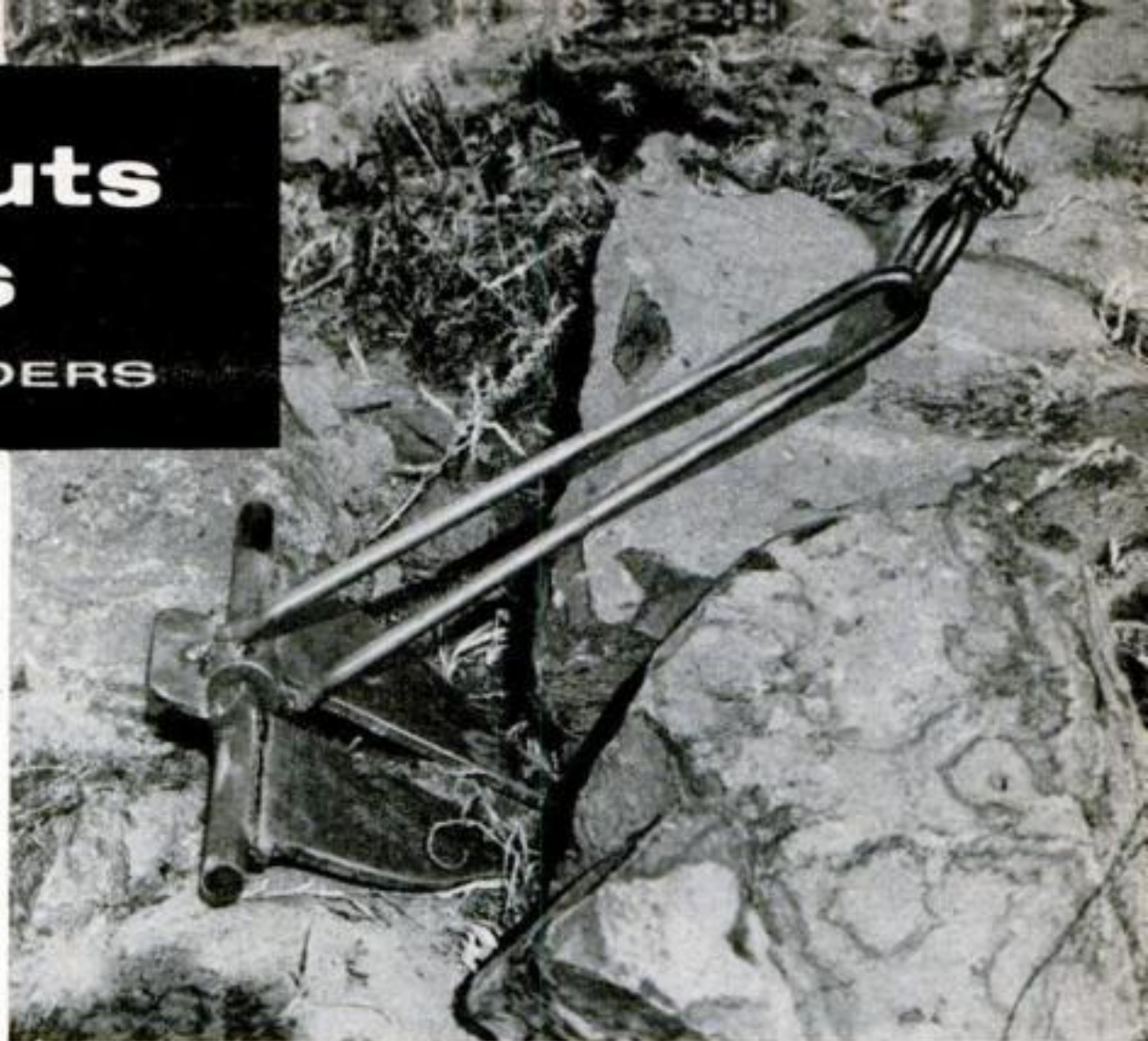
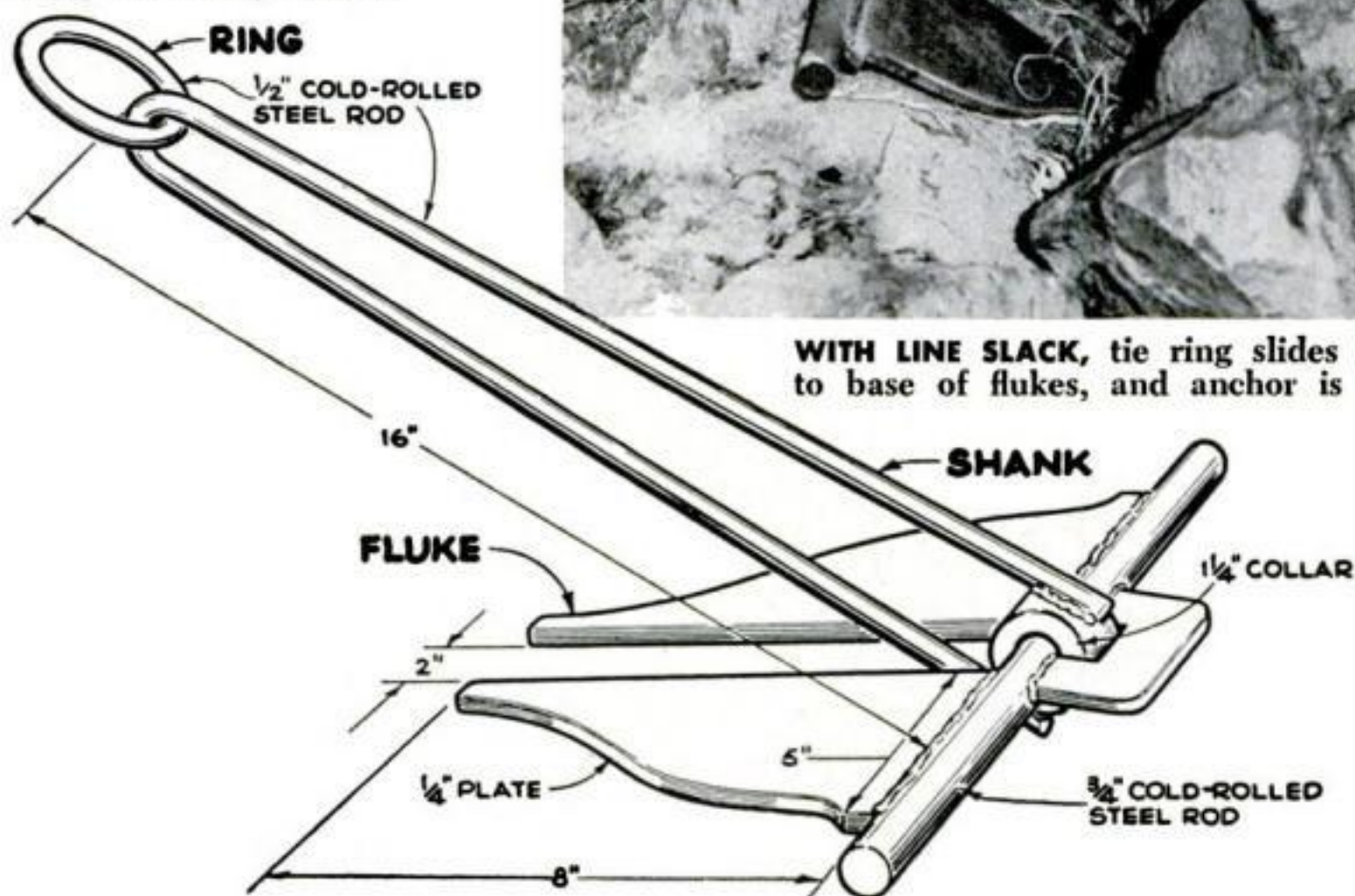
# Short Cuts and Tips

FROM PS READERS

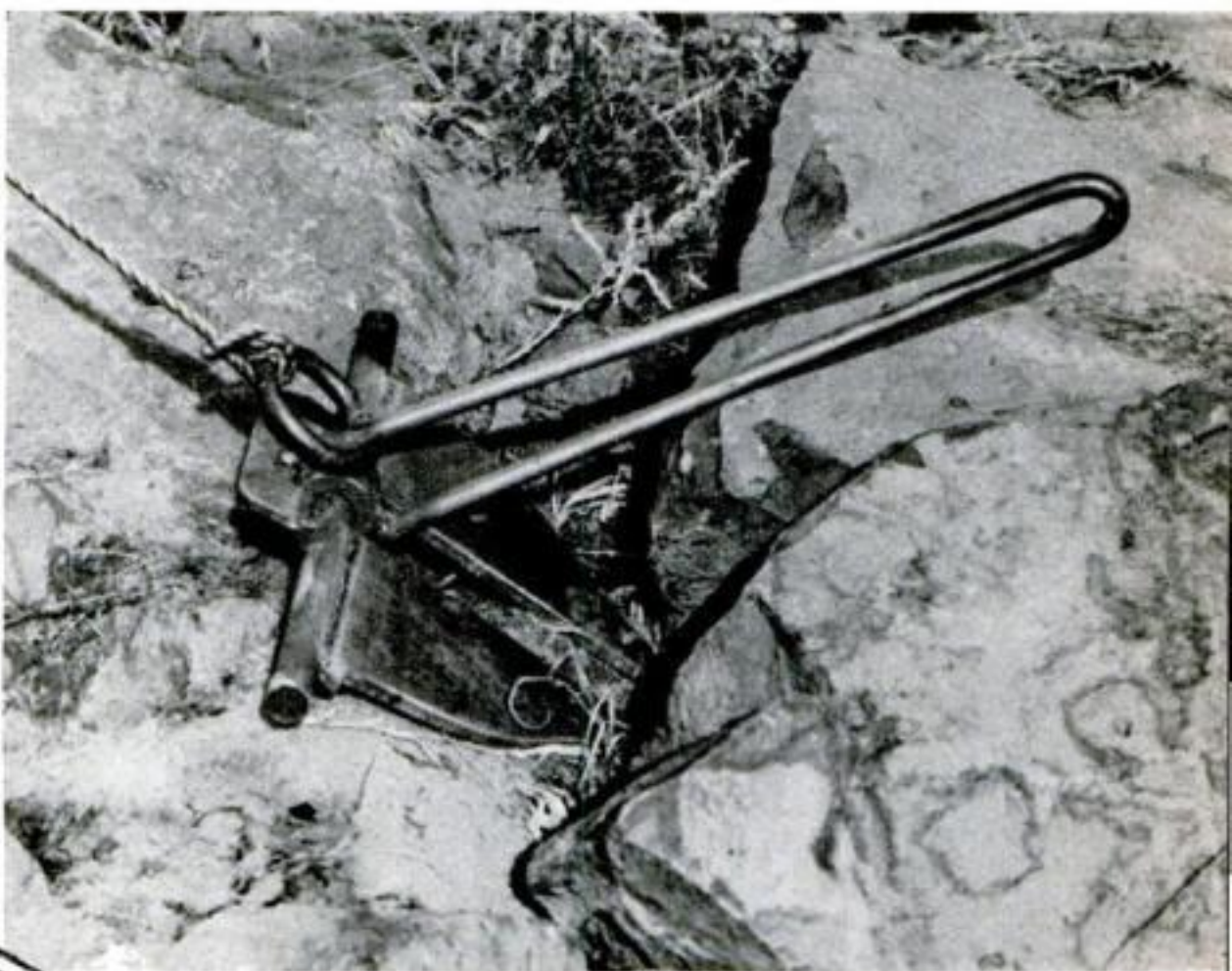
## Small-Boat Anchor Pulls Free of Snags

EVER spend hours trying to free an anchor from an obstruction? Here's a design you can make that won't stay fouled. The shank is a steel rod bent to hairpin shape. When you can't dislodge the anchor by a normal pull with the ring at the top of the hairpin, reverse the boat until it pulls in the opposite direction.

While the line is slack, the ring slides down the shank to the base of the flukes. Then a sharp tug, with the line at a flat angle, pulls the anchor free. For storage in the boat, the shank folds flat. The anchor can be welded of different-size parts depending on the weight needed to hold your boat in place.—*John O. Bock, Yakima, Wash.*



**ANCHOR CATCHES UNDER ROCKS** and can't be dislodged when pull is from end of shank, as in conventional anchor design.



**WITH LINE SLACK**, tie ring slides down shank to base of flukes, and anchor is pulled free.

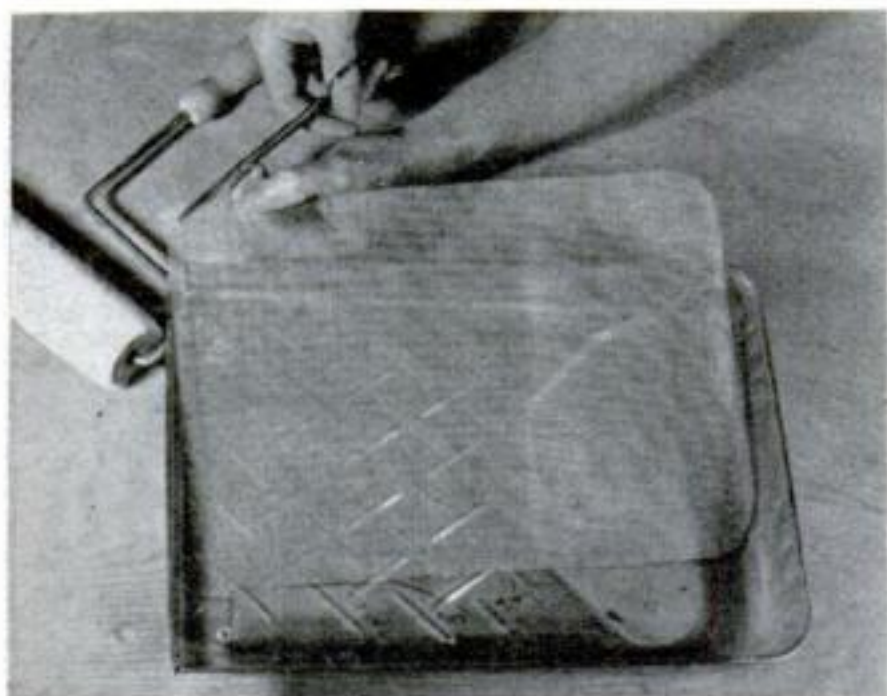


## Short Cuts and Tips

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### "Prefab" Box Meals Save Fuss on Trip

ON AUTO trips, my wife and I cut costs and save time by carrying along our own food. We pack each meal in a separate marked box, using canned foods, dry cereals, cake, tea and coffee. When we spot a good place for a picnic, we just park and pull the appropriate box out of the trunk.—*G. Warren, Woodbridge, Va.*



### Screen Improves Paint Roller

A PAINT roller will fill more evenly, without dripping, if a screen is placed in the paint tray. Cut a piece of ordinary window screening to fit the tray bottom. Load the roller in the usual way by running it into the paint reservoir, then rolling off the excess on the drip board. As the excess paint is squeezed out, it passes through the screen and runs back into the reservoir instead of piling up on the face of the roller. Clean the screen with a cloth dampened in solvent.—*Bradley Patterson, Bethpage, N. Y.*

.....

## Home-and-Shop Index Is Yours for the Asking

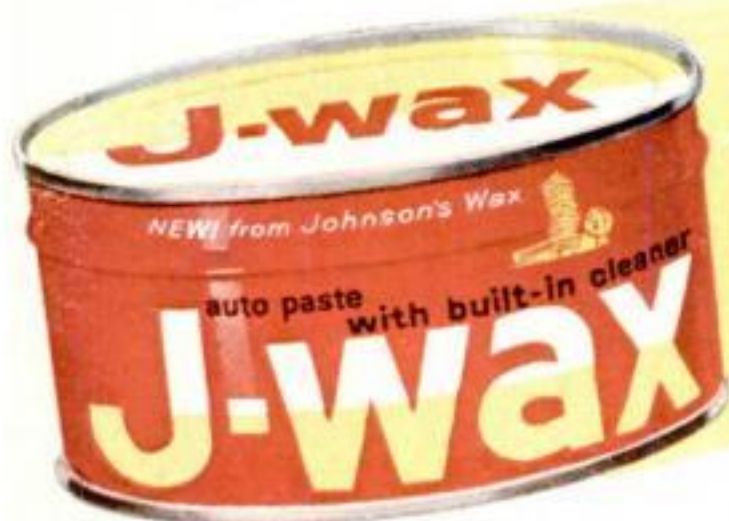
**D**O YOU keep a file of back issues of POPULAR SCIENCE? Would you like to make sure that you'll always be able to put your finger on home, shop and handicraft articles of special interest?

An index to help you is now ready. It covers the issues from July, 1956, through June, 1957, and is free to readers who request it, as long as the supply holds out. Just send your name and address on a card or in a letter, saying you want it. This index, for the months noted, is the only one available. Address your request to: Index Editor, POPULAR SCIENCE, 353 Fourth Ave., New York 10, N. Y.



# Faster paste waxing!

# Easier paste waxing!



## Start right in waxing!

## Johnson's new J-wax

## does the cleaning work for you!

**No extra cleaner needed  
—nothing else to buy!**

**J-Wax** has just what paste wax needed—a built-in cleaner! The exclusive J-Wax formula goes to work fast. Cleans while it waxes—saves you hours of work. J-Wax replaces grime with a glistening coat of wax. *Tough wax. Hard-finish wax* that protects your car in any weather.

J-Wax puts more wax on your car—leaves

more wax on your car than other one-step waxes. And J-Wax goes on smoothly, easily—evenly. Leaves no dull spots or streaks. You are sure of more all-around protection with J-Wax in any weather—from bumper to bumper, including the chrome!

Look for Johnson's J-Wax in this new key-opening can. Only J-Wax guarantees sealed-in freshness. It's the fastest, easiest way to genuine wax protection—*paste wax protection!*

"Johnson's Wax" and "J-Wax" are registered trademarks of S. C. Johnson & Son, Inc.



Chrysler Corporation  
pushbutton driving,\* now in  
its second year, is still the  
easiest and safest control  
of all. With new TorqueFlite  
transmission, you get  
unmatched smoothness and  
surge. This is engineering  
leadership. Plymouth, Dodge,  
De Soto, Chrysler & Imperial.

*\*Another big reason why The Switch is On to the cars of The Forward Look*



## Short Cuts and Tips

### Prop Holds Shoe for Professional Shine

SHINING shoes off the foot is easy if there is a clothes-line pole or a long one-by-two handy. Stand the shoe on a block projecting over the edge of the shop bench. Set the pole inside it and wedge the top of the pole against a ceiling joist. Shim as necessary with layers of newspapers.—*Andrew Vena, Philadelphia.*



### Treated Egg Carton Is Small-Parts Tray

KEEP an egg carton on your work bench and you can dip into its 12 compartments for frequently needed bolts, screws and other small parts. Coat a heavy, pressed-fiber carton with shellac or varnish, and it will take rough handling.

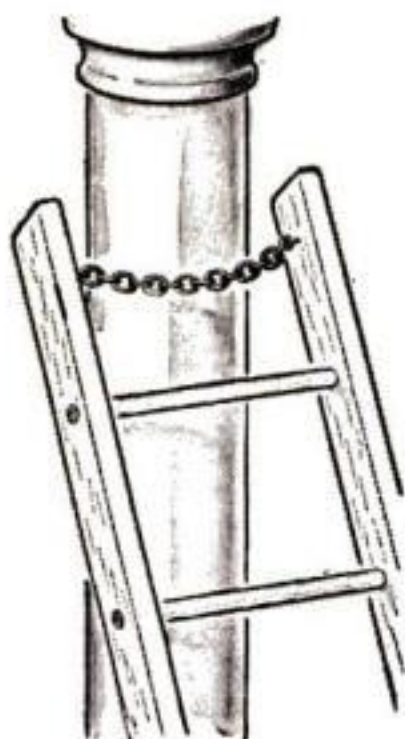


▶▶▶MY HANDS are often soiled from shop work when I use my slide rule, and it picks up a lot of grime. To clean the rule, I use toothpaste. The paste contains just the right amount of grit for a nonscratching job.—*Forest P. Clark, Wildwood, N.J.*

### Chain Is Safety Rung for Ladder

EVER have to set a ladder against a column or post narrower than the space between rails? It's dangerous.

To make it rest securely, substitute a chain for the top rung, hanging it slack so it will hug the column. Rubber hose placed around the chain will protect the post.—*George Lynch, Asheville, N.C.*



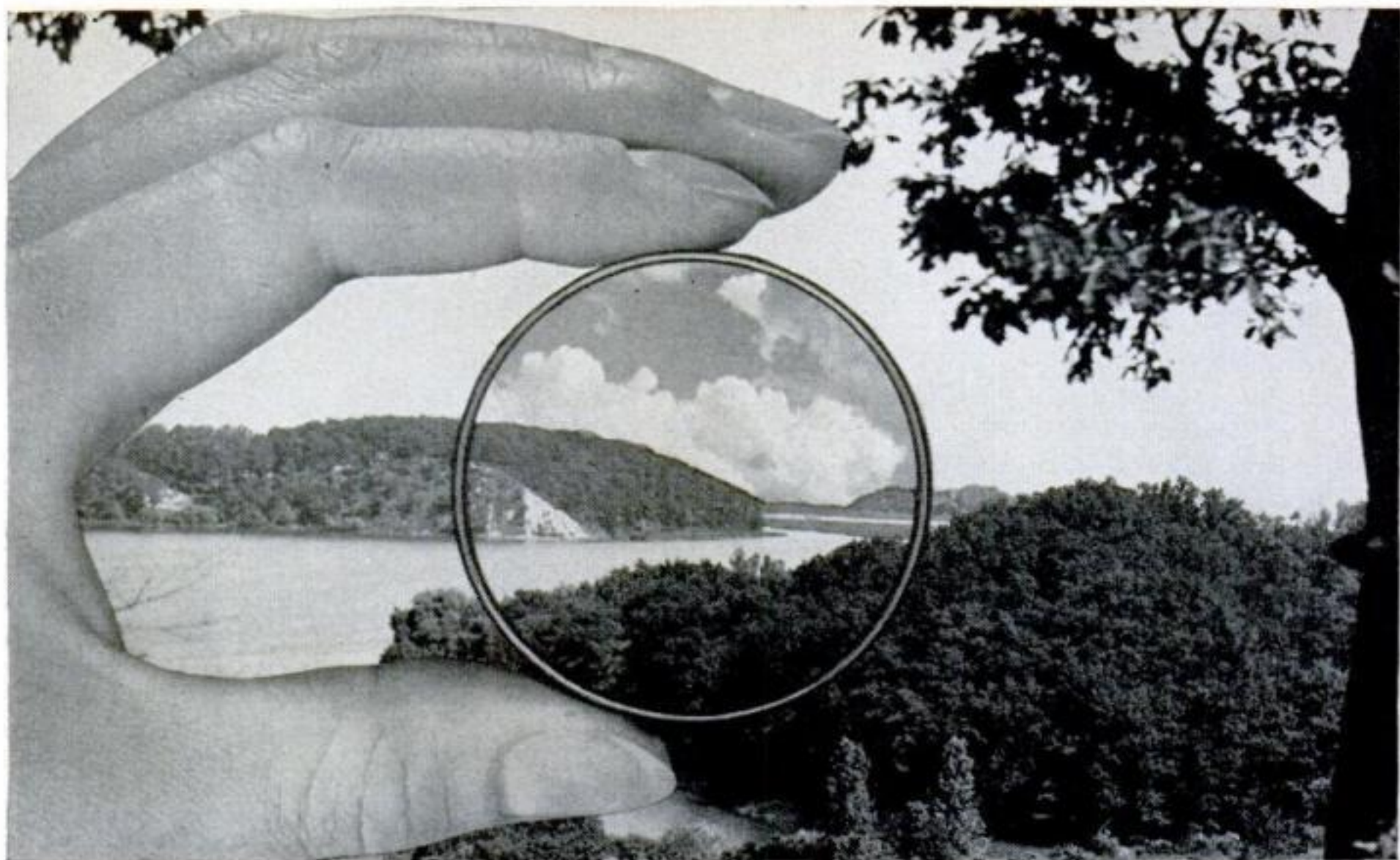
### Block Mount Dramatizes Photo

A FINE snapshot can make a dramatic portrait if blown up and silhouetted on a background of wallboard or hardboard. Paint the board before mounting the cutout. Then glue a wood block to the back and put a screw eye in it to make the picture hang flat.

The background color and the light and shadow on the unframed mount add interest.—*Frank A. Javor, Newark, N.J.*







## *From Kodak—* **32 ways to**

Now's the time to choose the photo aids that will make your picture taking easier . . . more satisfying . . . this summer. Your photo dealer will be glad to help you decide *which* Kodak filters and photo aids *exactly suit* your picture-taking needs. See him soon!

### **Use these filters for color pictures . . .**

**Kodak Skylight Filter (No. 1A)**—The most popular outdoor filter for color. Reduces excess bluish light on hazy days, in open shade. Gives warmer tones to distant shots, aerial photographs.

**Kodak Daylight Filter for Type A Color Films (No. 85)**—Adapts Type A (indoor) Kodachrome Film (8mm and 16mm movie size) for outdoor use.

**Kodak Daylight Filter for Type F Color Films (No. 85C)**—Adapts Type F (indoor) Kodachrome and Ektachrome Films for outdoor use.

**Kodak Photoflood Filter, No. 80B** (for Kodak Daylight Type Color Films)—Adapts Daylight Type Kodachrome and Ektachrome Films for use with photoflood lights.

**Kodak Photoflash Filter, No. 80C** (for Daylight Type Color Film)—Adapts Daylight Type Kodachrome and Ektachrome Films for indoor use with clear flash lamps.

### **Use these filters for black-and-white pictures . . .**

**Kodak Wratten K-2 Filter (and Kodak Yellow Pictorial Filter)**—Most popular outdoor filters for black-and-white films. Brings out clouds in blue sky, enhances tone values in any scene.

**Kodak Wratten G Filter**—Darkens sky and water . . . reduces atmospheric haze in landscape shots.

**Kodak Wratten A Filter (and Kodak Red Pictorial Filter)**—Produces dramatically dark skies. Creates moonlight effects on daytime scenes.

### **For both black-and-white and color pictures . . .**

**Kodak Pola-Screen**—The only filter that will darken the sky for color film without changing other colors. Controls glare on glass or water.

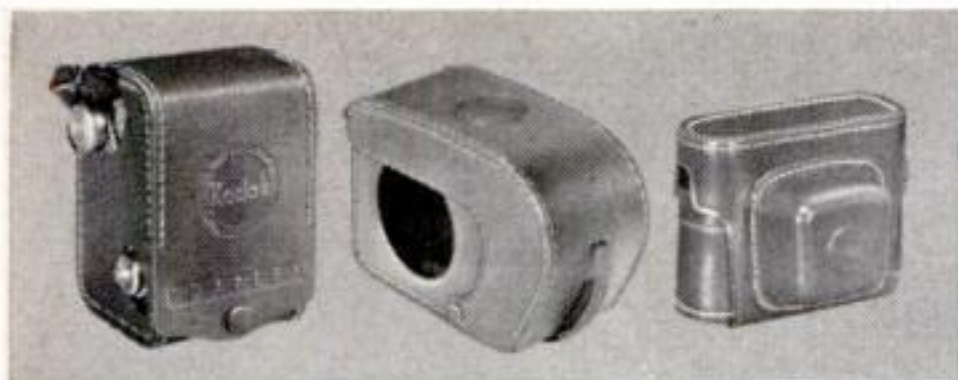
**Kodak Portra Lenses**—Use over your regular lens for "close-ups" of small objects. Available in sizes and magnifying strengths to fit most any camera.

**New . . . Handy Kodak Filter Kit** comes complete with the basic filters for the kind of pictures *you* want to take. Available for most any still or movie camera, from \$6



**EASTMAN KODAK COMPANY, Rochester 4, N. Y.**





**Kodak Field Cases**—Your camera is fully protected and instantly ready for use. There's a handsome field case to fit almost every Kodak camera. From **\$2.65**



**Kodak Flashholders**—Enjoy picture taking indoors! Kodak B-C Midget, or Standard Flashholders fit most cameras. Prices start at only **\$3.50**



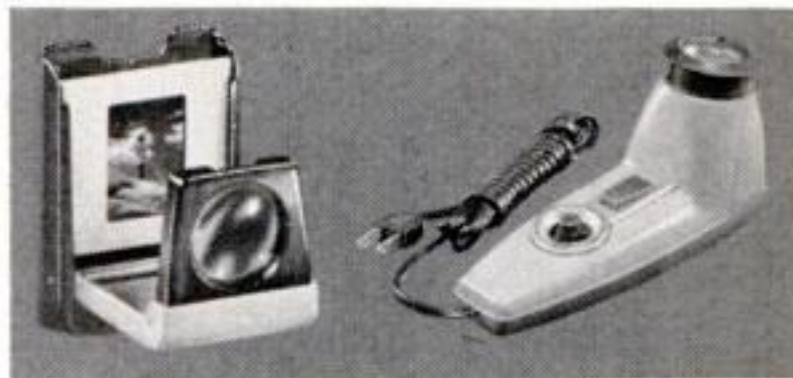
**Kodak Rotary Flasholder**—Takes 6 flash shots without reloading. Fits most cameras, **\$9.95** and **\$11.95**



**Kodak Flexiclamp**—Clamps in place to hold your camera or extension lights rock-steady. **\$5.95**



**Kodak Auto-Release**—Lets you get in your own pictures, **\$4.50** (Attaches by cable release, **\$1.25**)

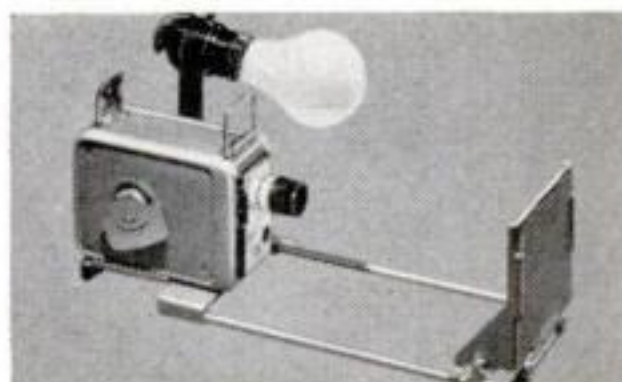


**Kodaslide Pocket Viewer**—Magnifies your color slides 4 times! **\$1.95**. **Kodaslide Dial-Lite Viewer**—Plugs into wall receptacle for bright, internal illumination. Completely adjustable for top-quality viewing. **\$8.95**

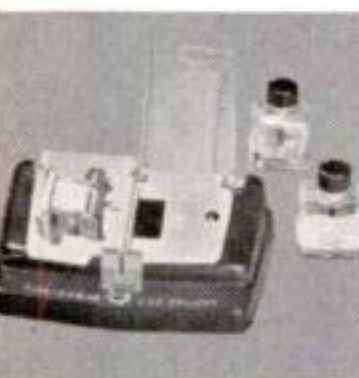
## increase summer picture fun



**Kodak Photo-Hobby Outfits**—Everything needed to develop black-and-white films and prints, from **\$9.95**. **Kodak Ektachrome Processing Outfit, 35 mm**—For processing—mounting 35mm Ektachrome color slides. **\$26.50**



**Brownie Movie Titrer Outfit**—Makes all kinds of home movie titles. Fits all Brownie Movie Cameras, **\$14.95**



**Cine-Kodak Duo Splicer Outfit**—Everything needed to cut, rejoin your home movies, **\$9.95**



**Kodak Telephotos**—Low-cost telephoto and wide-angle converters for Brownie and Medallion Cameras, **\$16.95** each. Telephoto Lenses to fit most cameras, from **\$49.50**



**Kodak Reels and Cans**—Help protect your films from scratches, dust and curl. From **50¢**

**Kodak**  
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*Prices are list and subject to change without notice*



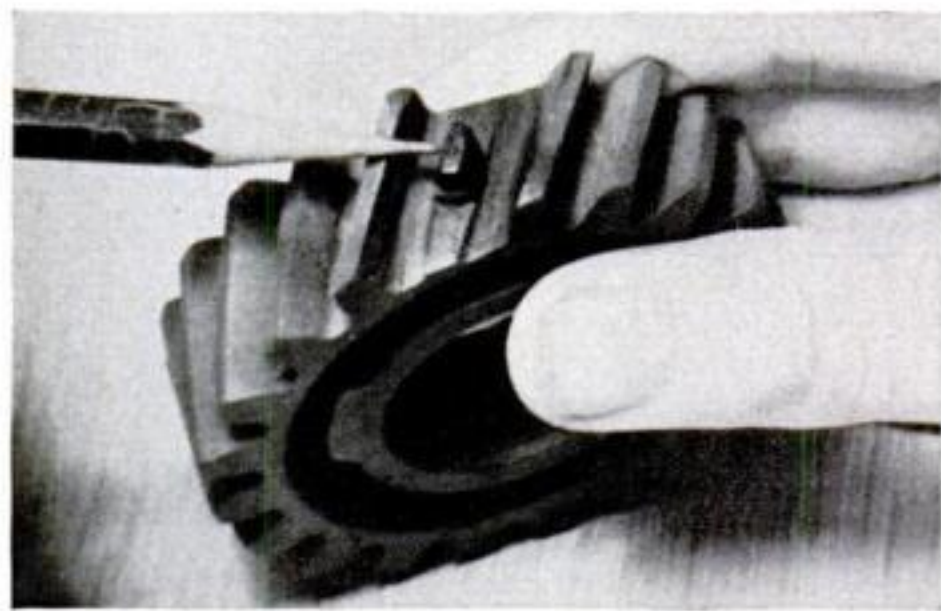
## Short Cuts and Tips

### Aluminum Foil Makes Template

FOLDED double and pressed against any irregular contour, a piece of ordinary kitchen aluminum foil can be shaped into a firm template.

I use this trick to fit floor tile around moldings. After impressing the curves on the foil, I trace the outline onto the tile and cut it for a perfect fit.

—George Glowaty, NYC.

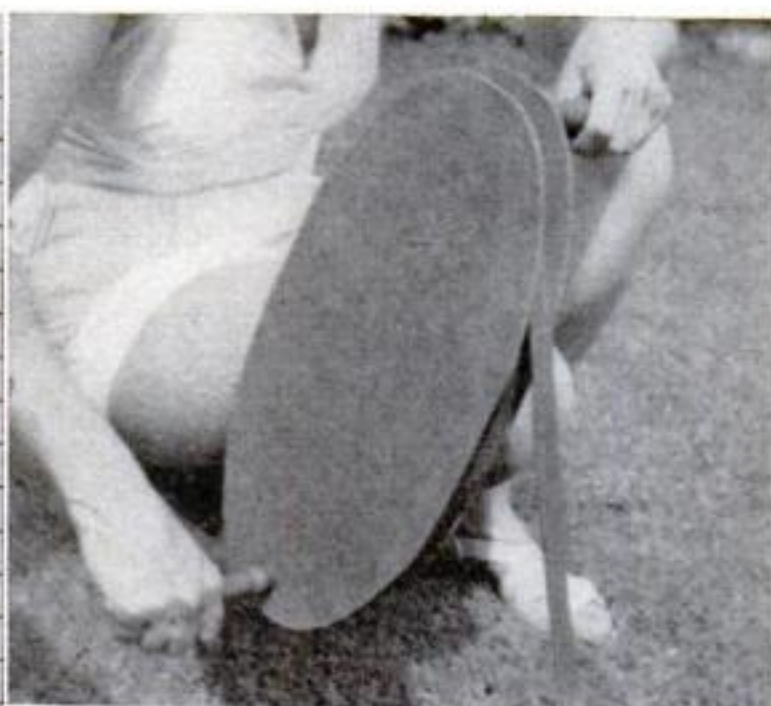
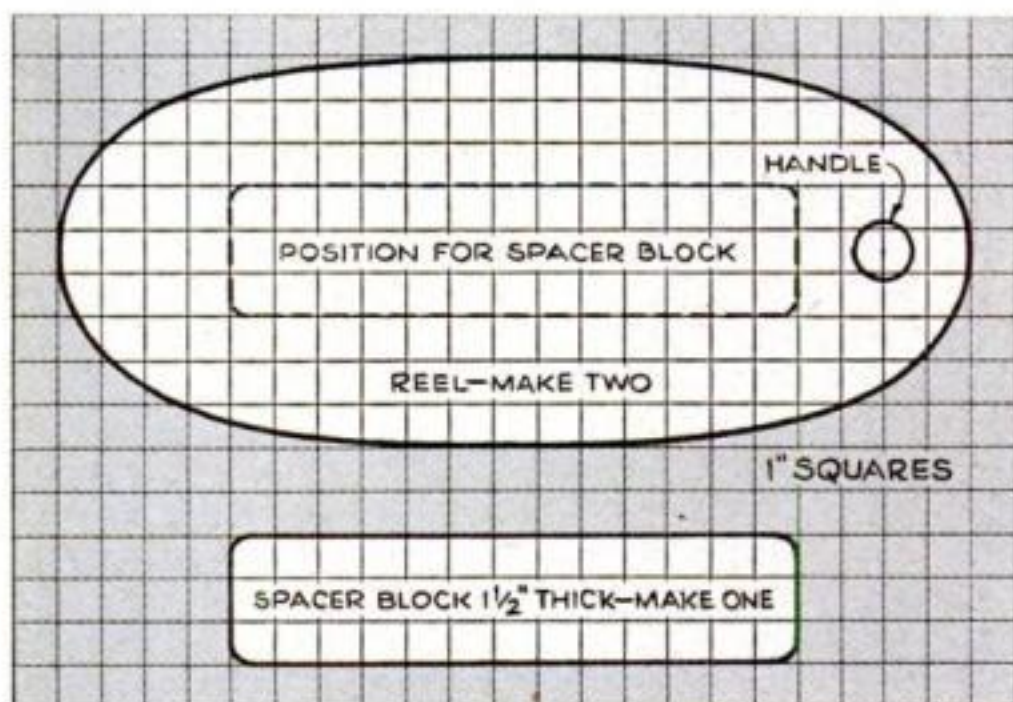


### Stud Fills In for Gear Tooth

WHEN a tooth broke off a gear in our washing machine, I made an easy repair. I heated the gear cherry-red and let it cool slowly to remove the temper. Then I drilled and tapped a hole where the tooth was missing, screwed in a steel stud and filed it to shape.

To restore the gear's temper, I reheated it until it was cherry-red again and then dropped it into crankcase oil.

—John A. Comstock, Wellsboro, Pa.

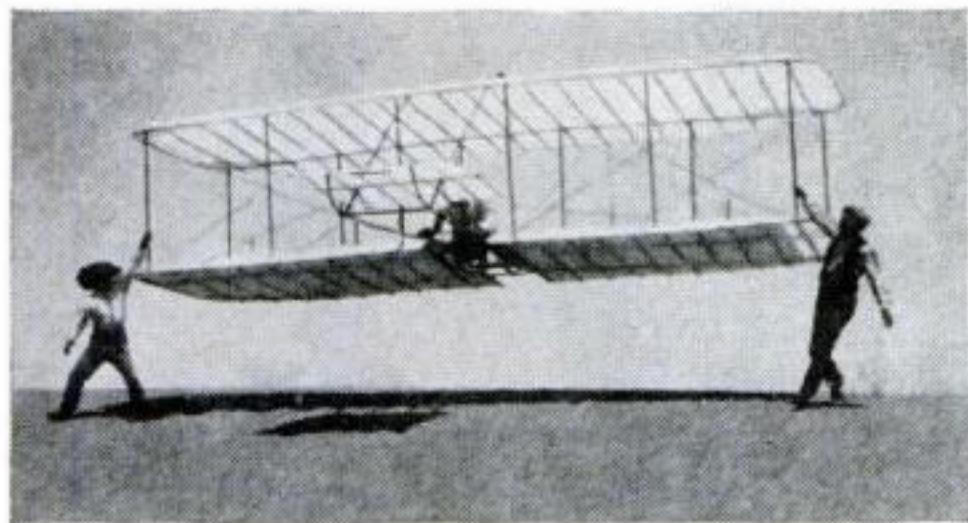


### Two-Handled Free Reel Winds Up Lawn Soaker

Two ovals cut from 1/8" hardboard made a simple reel for my perforated garden hose. An oblong of 1½" wood is fastened between them with waterproof glue

and a couple of short brads. To make it easy to unreel or roll up the soaker, I put handles at opposite ends of each oval.—A. R. Tanner, Poughkeepsie, N. Y.





*A great heritage*

*A great future*



# 50

YEARS OF  
AIR POWER

# GO

## U. S. AIR FORCE

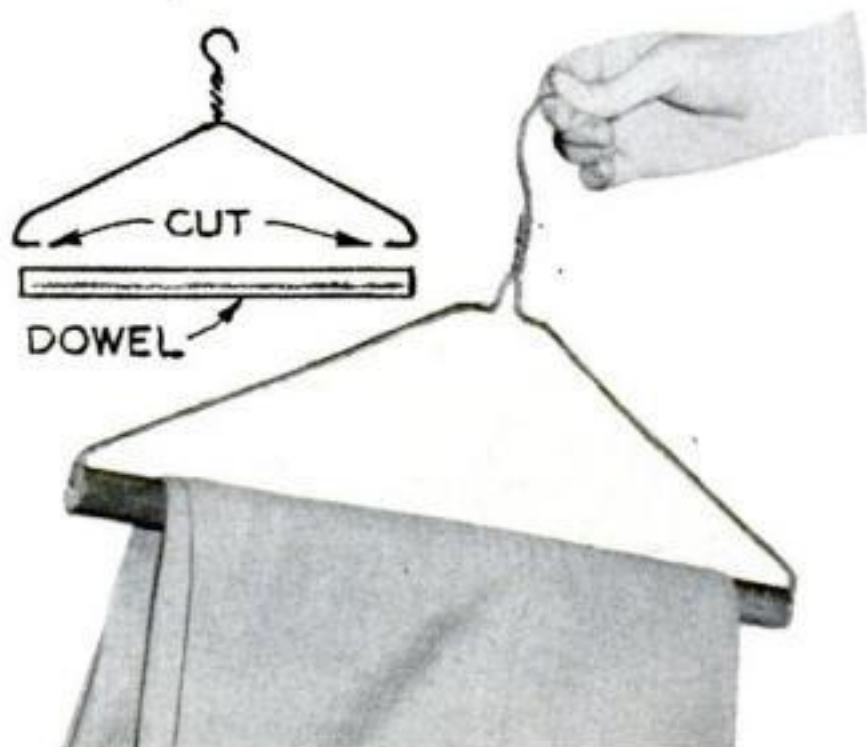
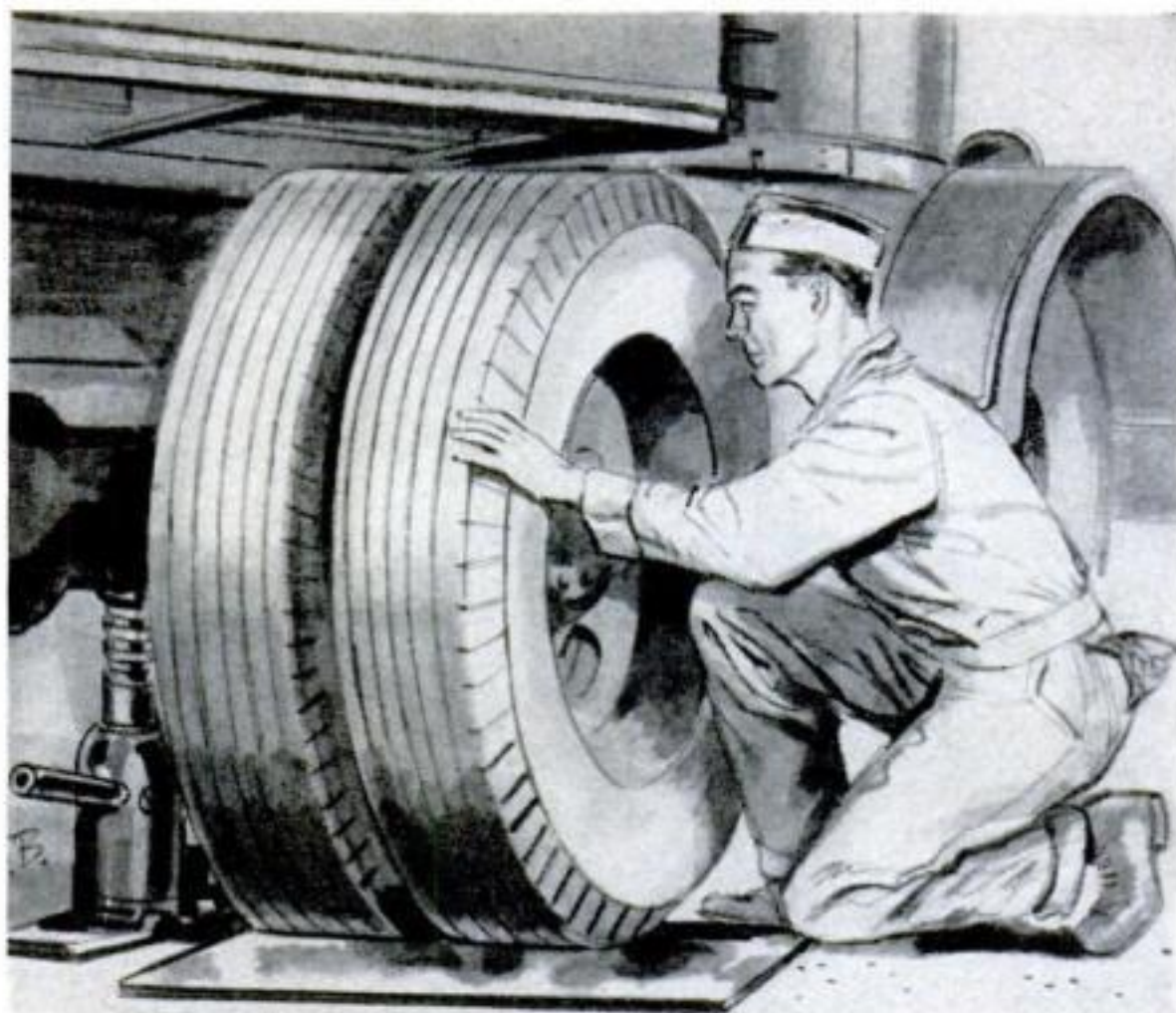
For complete information on your opportunities as an Airman in the U. S. Air Force, write, giving your age, to: Airman Information, A-105, P. O. Box 7608, Washington 4, D. C.



## Short Cuts and Tips

### Greased Plate Eases Wheel Change

TO PULL or replace heavy dual wheels, a California mechanic saves muscle with grease. He jacks up the truck until the tire barely clears the floor, and slides a sheet-metal plate coated with grease under the wheel. Then he pulls the wheel over the slippery surface without having to lift the assembly. —Hi Sibley, Nuevo, Calif.

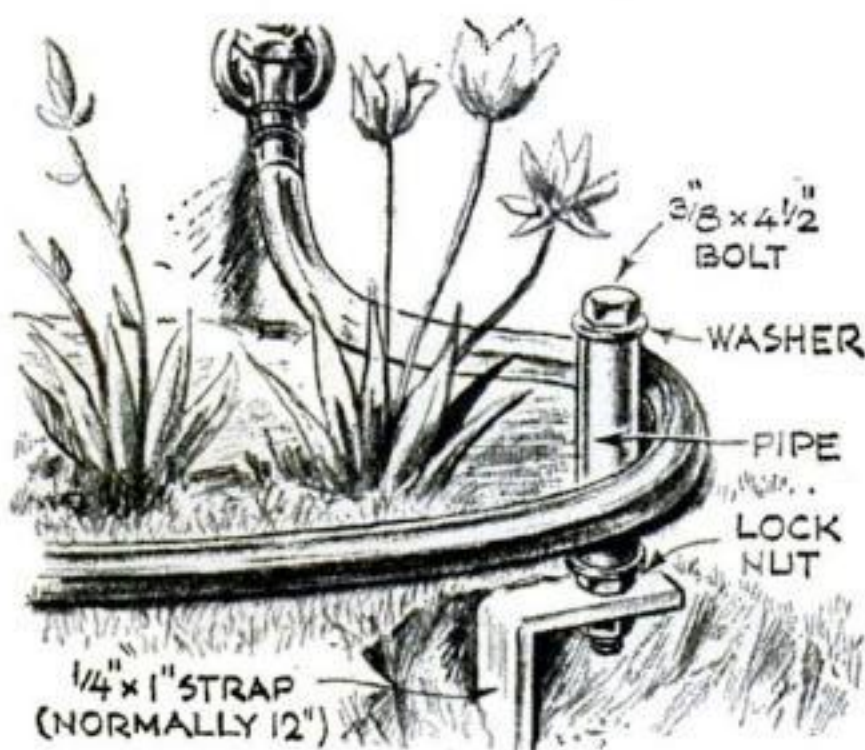


### Broomstick Improves Hanger

IF YOU'RE short on hangers for summer slacks, you can adapt cheap wire hangers to serve. Cut off most of the crossbar, leaving ends  $1\frac{1}{2}$ " long. Drill a large dowel or a length of broomstick at each end to take the wire stubs and slip the stubs in the holes. The jumbo crossbar won't press creases into trousers folded over it. —R. V. Thompson, Clinton, Ia.

▶▶▶ A NAIL set is always there when you need it if you keep it in the handle of the hammer. Boring inward from the end of the handle, make a small hole deep enough to take the nail set. When storing the countersinking tool, seal the hole with masking tape or plug it with a cork. —Thurston Powell, Alexander City, Ala.

▶▶▶ THE dust that collects inside the cases of field glasses and binoculars can work its way under the lenses. It is a good idea to wipe out an all-leather case every now and then with a damp cloth. Use a dampened brush or the small nozzle of a vacuum cleaner to clean a felt or velvet lining. —R. M. Woodbury, Natick, Mass.

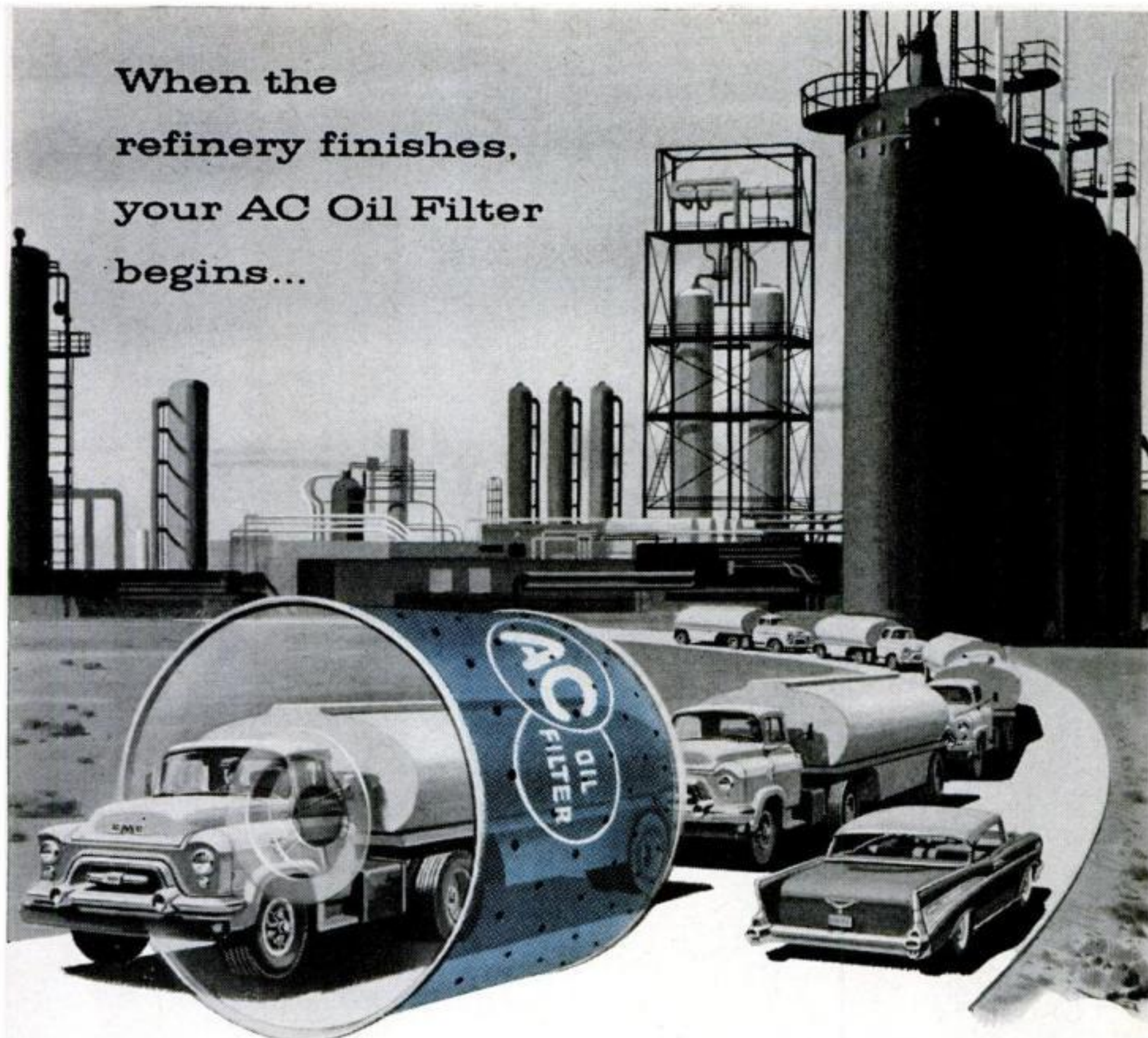


### Plant Guard Rolls with Hose

A LOOSE-FITTING pipe around a machine bolt will make a plant guard that rotates if a hose is dragged around it. Cap the ends of the pipe with washers and secure the bolt with a lock nut. Mount the oiled roller on strap iron bent into an L and drilled in one leg for the bolt. Bury the mount so that the roller just clears the soil. —C. H. Hardy, Whittier, Calif.



When the  
refinery finishes,  
your AC Oil Filter  
begins...



...cleaning 36,000 gallons  
of oil every 5,000 miles!

Change your



**OIL  
FILTER**  
every  
5,000 miles

An almost unbelievable volume of oil recirculates through your AC Full-Flow Oil Filter in 5,000 miles of driving—as much as 36,000 gallons.

Your oil filter is faced with the job of cleaning that vast quantity of oil in six months or less of average driving . . . a full six quarts for every 30 seconds at normal speeds.

That's why it's so important for you to change your AC Oil Filter regularly. A fresh AC Filter takes out dirt and bits of metal as small as 1/100,000 of an inch. It keeps your oil clean and on the job . . . protects the vital engine parts in your car from the damage dirt can do.

When you change your oil, check the mileage since your last filter change. For your engine's sake, change to a new AC Oil Filter at least every six months or every 5,000 miles your car is driven.

AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS

JULY 1957 185

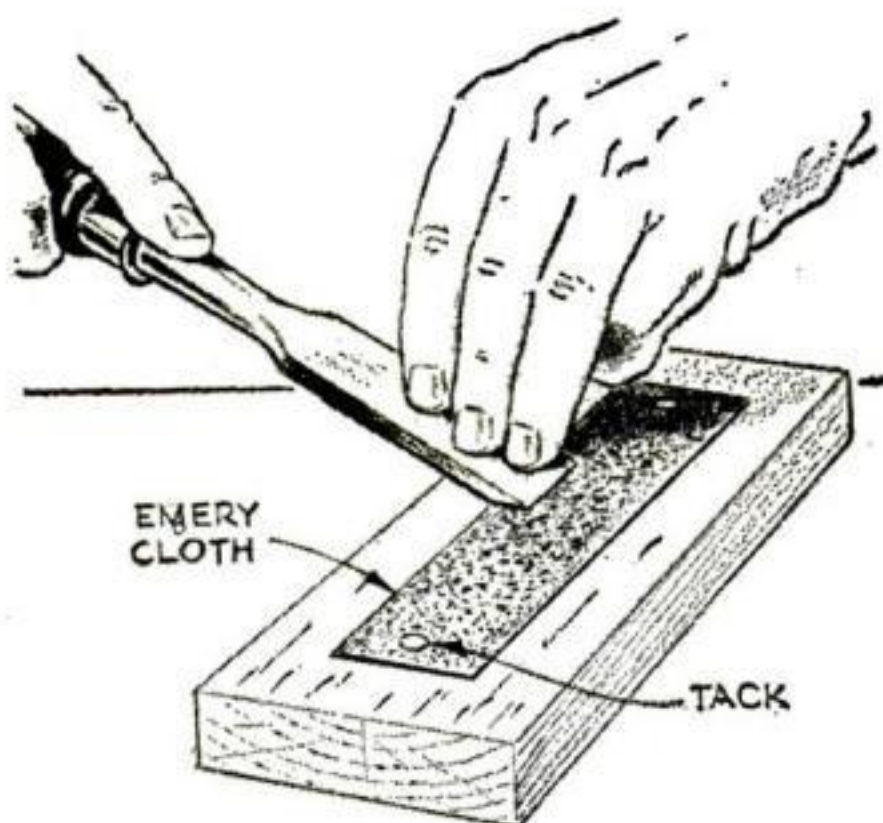


## Short Cuts and Tips



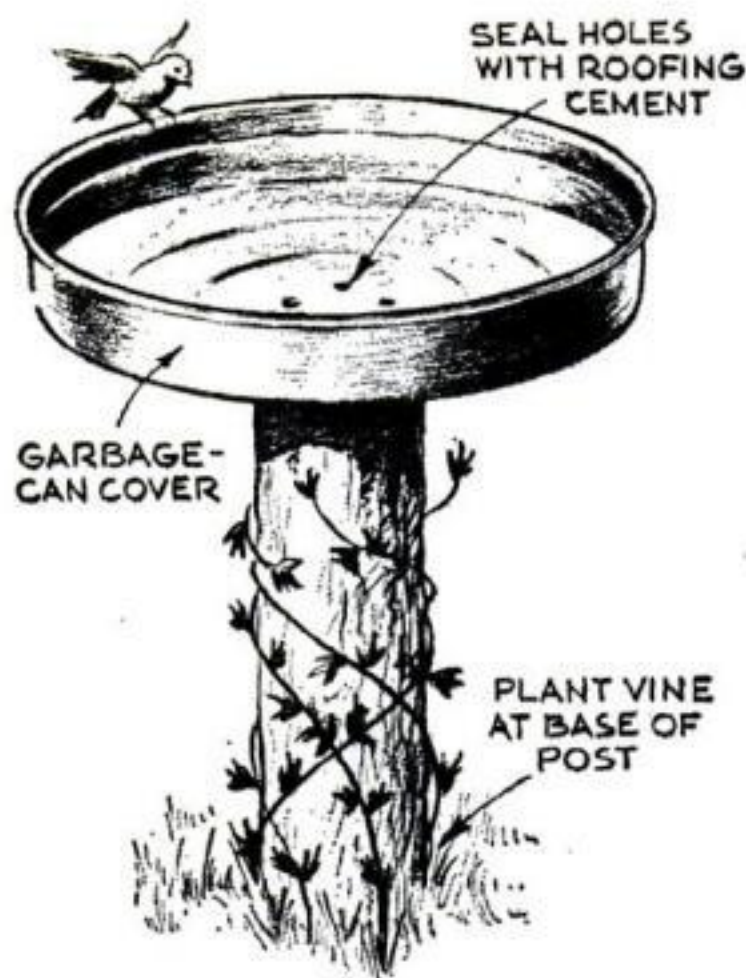
### Plastic Keeps Glue Off Clamps

WOOD glue oozing from a joint won't gum up clamps or clamping blocks if sheet vinyl is laid over the joint. Most adhesives refuse to stick to this material. A spot test will tell you if your brand has any effect on the plastic. The sheet seals off air, however, so drying time is lengthened.—*Walter E. Burton, Akron, O.*



### Emery Strip Makes a Hone

EMERY cloth thumbtacked to a board will sharpen a cutting tool faster than a honing stone. With the tool blade at a right angle to the abrasive, move the cutting edge sidewise the length of the strip. Finish with No. 324 grit and a few strokes on a leather strop for a razor-sharp edge.—*C. L. Bossmeyer, Dixon, Ill.*



### Birds Drink from Can Lid

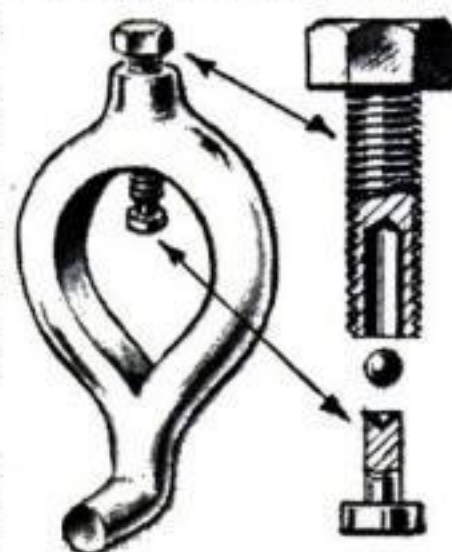
IF THE cover is still in good shape when you discard a worn-out garbage can, you can turn it into a fine bird bath. Just nail the lid to the top of a post or a four-by-four and seal the holes with roofing cement. Paint the bird bath white, and plant a vine at the base of the post.—*Victor H. Lamoy, Upper Jay, N.Y.*

▶▶▶THERE are many places to hide a house key, but a jardiniere that holds a potted plant just outside our door is most convenient for us. The key is dropped into the outer pot and those in on the secret merely lift the inner pot to reach it.—*G. E. Hendrickson, Argyle, Wis.*

### Hard-Grip Lathe Dog Won't Bite

TO GIVE a lathe dog a good grip, and still keep it from marring highly finished surfaces, bore a concentric hole  $\frac{1}{4}$ " in diameter in the end of the setscrew.

Now turn a brass stud with a flat head and  $\frac{1}{4}$ " shank, and drill a slight cavity in the shank end. Drop a bearing ball in the setscrew hole and then insert the stud. Without direct friction between the setscrew and the work, the dog can be tightened for high driving force.—*F. Strasser, Santiago, Chile.*





# AUTO-LITE **POWER TIP** "fires up" winners in 1957 Mobilgas Economy Run



IMPERIAL CROWN . . . Winner in both High Price Class and Sweepstakes



CHRYSLER SARATOGA V-8... Winner in Upper-Medium Price Class



DE SOTO FIREDOME V-8 . . . 2nd Place in Upper-Medium Price Class



DODGE CORONET 500 V-8 . . . Winner in Low-Medium Price Class



PLYMOUTH BELVEDERE V-8 . . . Winner in Low Price Class



Victory sweep by Chrysler-built cars proves that Auto-Lite Spark Plugs with **POWER TIP** deliver top performance and economy at all speeds.

The 1957 Mobilgas Economy Run gives dramatic evidence of Power Tip's ability to give top performance and economy in all kinds of driving . . . at all speeds. For 1568 miles, in the mountains, on the highway, and in city traffic, Power Tip sparked the winners to victory. Here's how Auto-Lite Spark Plugs with Power Tip operate . . .

At *low speeds*, the projecting spark plug tip . . . the Power Tip . . . gets hot fast, operates hotter to burn away fouling deposits which impair engine performance in city driving. At *high speeds*, the Power Tip is actually cooled by the richer air-fuel

mixture to check costly and dangerous high-speed pre-ignition caused by overheated spark plugs.

Power Tip, first spark plug ignition-engineered for today's engines and today's driving, is designed for overhead-valve V-8 engines and for most overhead-valve 6's in all these cars: Buick, Cadillac, Chevrolet, DeSoto, Chrysler, Dodge, Plymouth, Ford, Hudson, Imperial, Lincoln, Pontiac, Mercury, Oldsmobile, Studebaker, Nash, Packard, Rambler.



Mobilgas Economy Run, sponsored annually by Socony-Mobil, is rigidly supervised by the Sports Commission of the United States Auto Club.



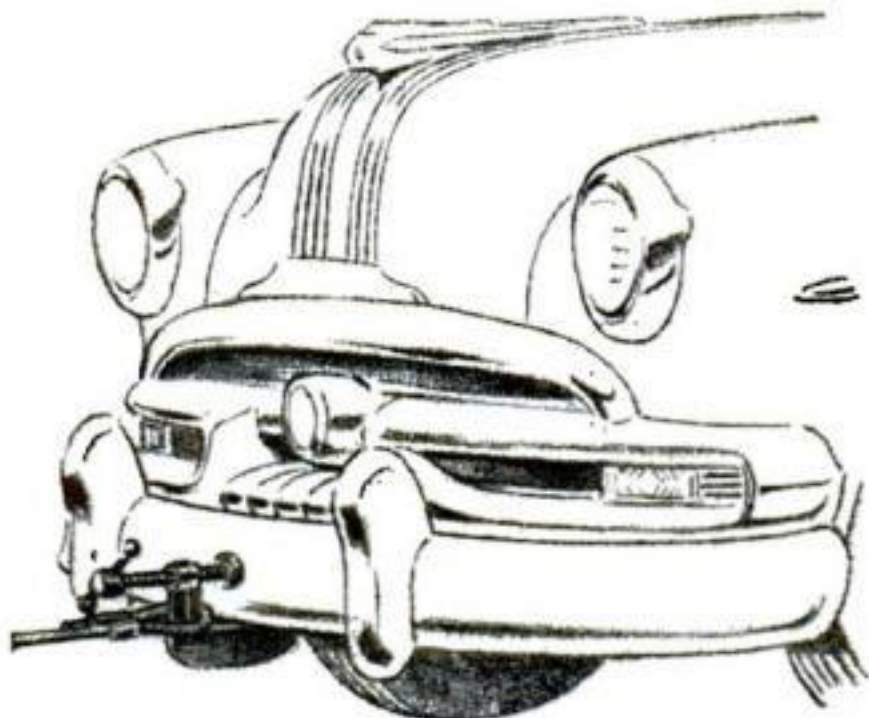
The protruding tip makes the big difference!

## AUTO-LITE<sup>®</sup> RESISTOR SPARK PLUG WITH **POWER TIP**

Auto-Lite makes a complete line of spark plugs, including Standard, Resistor, Small-Engine, Transport, Aircraft, and Diesel-Starting.

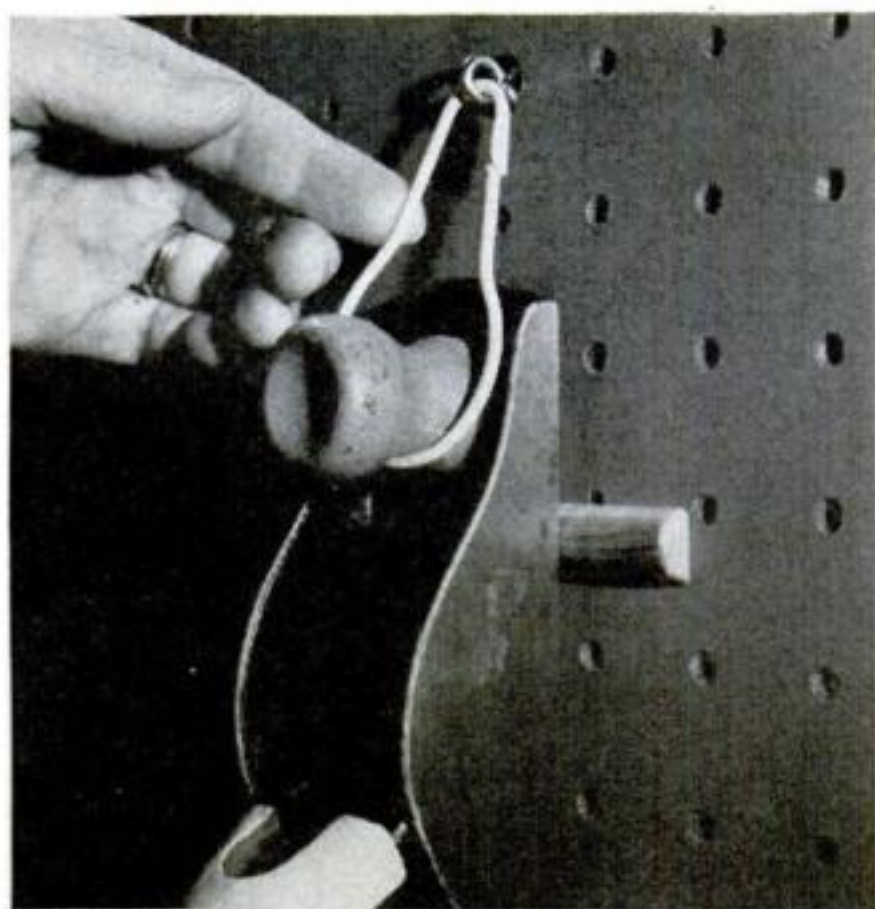


## Short Cuts and Tips



### Clamp Takes Tow Cable

It's a good idea to keep a C clamp in the trunk of your car. Clamped to the bumper or frame of a disabled automobile, it makes an excellent hook for a tow cable. —Norm Jacky, Fond du Lac, Wis.



### Noose Hangs Plane on Board

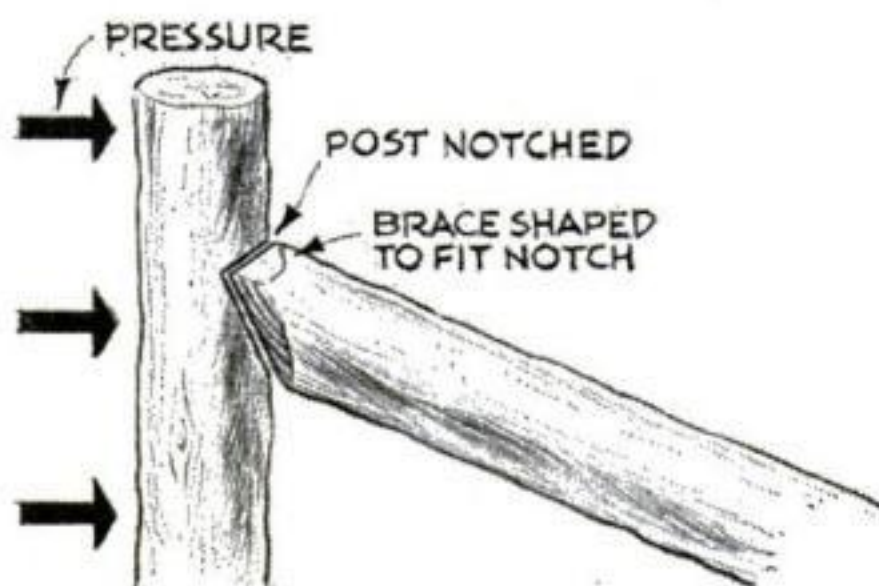
I HANG my plane in a shower-curtain ring clipped to my perforated tool board. A screw eye turned into a hole backed with a wood block holds the ring. Below this, I tacked on a strip of half-round to keep the cutting edge of the tool clear of the board. —F. A. James, Newark, N.J.



### Tape Identifies Luggage

I CAN spot my luggage in a hurry on train platforms or in airline terminals. Each bag is marked at its ends with giant initials made with pressure-sensitive tape. I use a bright metallic tape for dark bags; dark tape to identify light-colored luggage. —Pat Bradley, Babylon, N.Y.

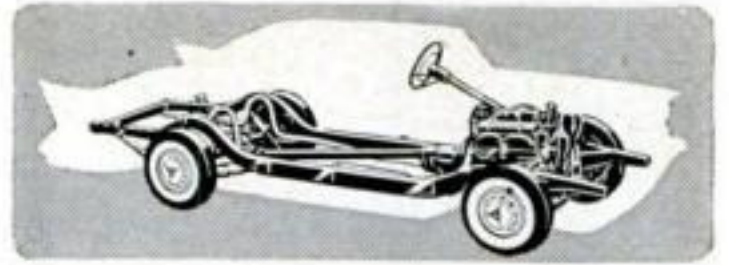
▶▶▶ WHEN a shop project calls for a non-mar bottom, I cut 1" squares from a thin plastic sponge. Cemented in place under the corners, these resilient cushions work as well as rubber feet or a felt covering. —John Compton, Johnstown, Pa.



### Wedge Keeps Post Upright

A POST that is driven into the ground can be braced without the use of nails. Just chop a notch in the post and shape the brace to fit snugly into it. This simple trick is worth remembering on camping trips when tools and hardware are lacking. —Lester Victor, Syracuse, N.Y.





**X-RAY ON CHEVROLET**

## **Roadability begins with “silk glove” steering**

Nothing—not even performance—adds as much to solid driving pleasure as roadability. And roadability has its rock-bottom beginning with the silky, surgically precise steering that is Chevrolet's hallmark.

That's Ball-Race steering—a special *system* of steering in which a micro-polished spiral of steel ball bearings transmits your fingertip hint into turning motion—with sports car accuracy.

Chevrolet uses ball bearings because there's much less “drag” with *rolling*

friction than with the usual *sliding* friction. And we've taken extraordinary care in designing the Ball-Race system because, basically, nothing short of power steering can make the miles seem so fatigue free. Try it and you'll know why! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.





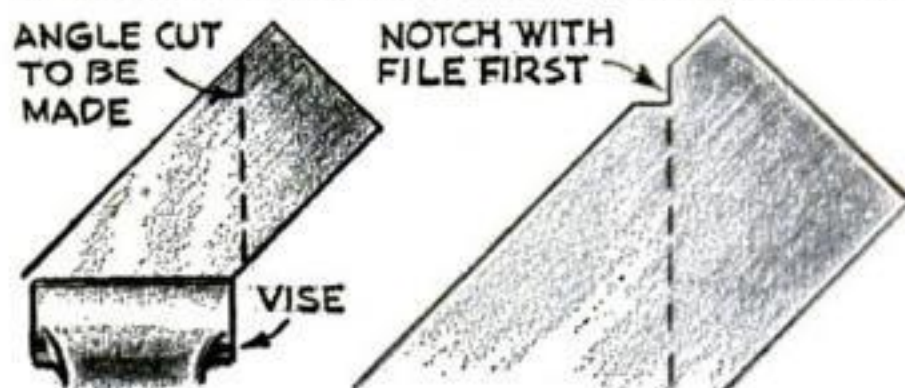
## Short Cuts and Tips

### Car Radio on Hook Lifts Off Easily

OUR car radio—a transistor portable—hangs in a sling at the center of the dashboard and lifts off for use anywhere. A hook bent from wire is sewed between the straps. It slips into a screw eye at the base of the windshield. Another strap, screwed under the dash, could prevent jouncing.—*L. Vaniman, Salina, Kan.*



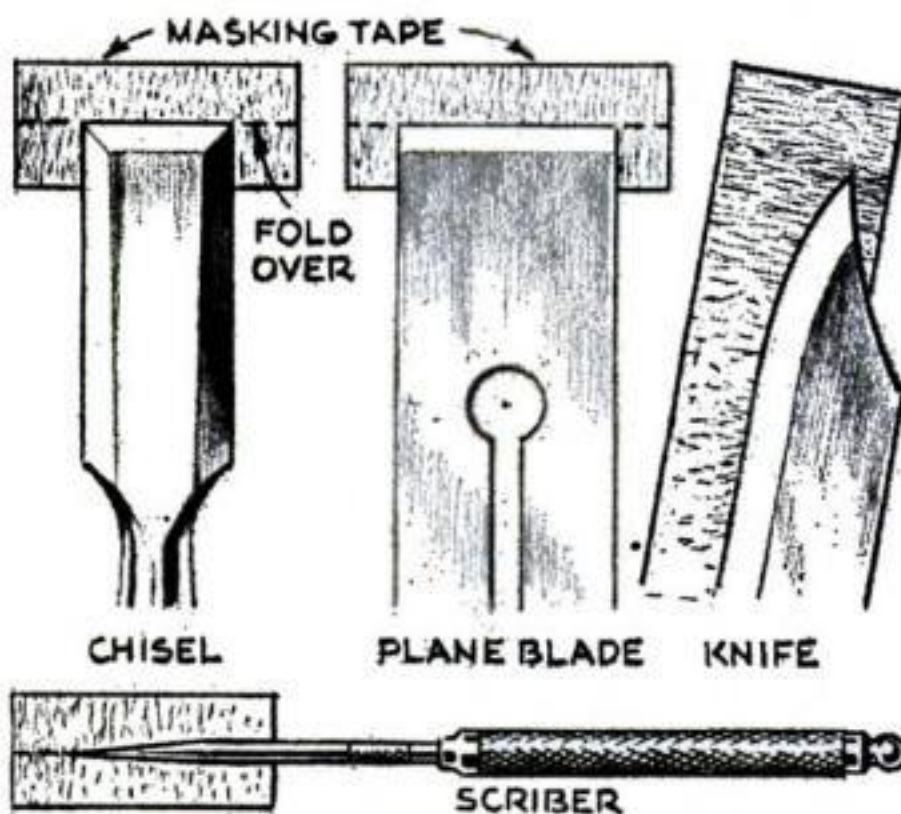
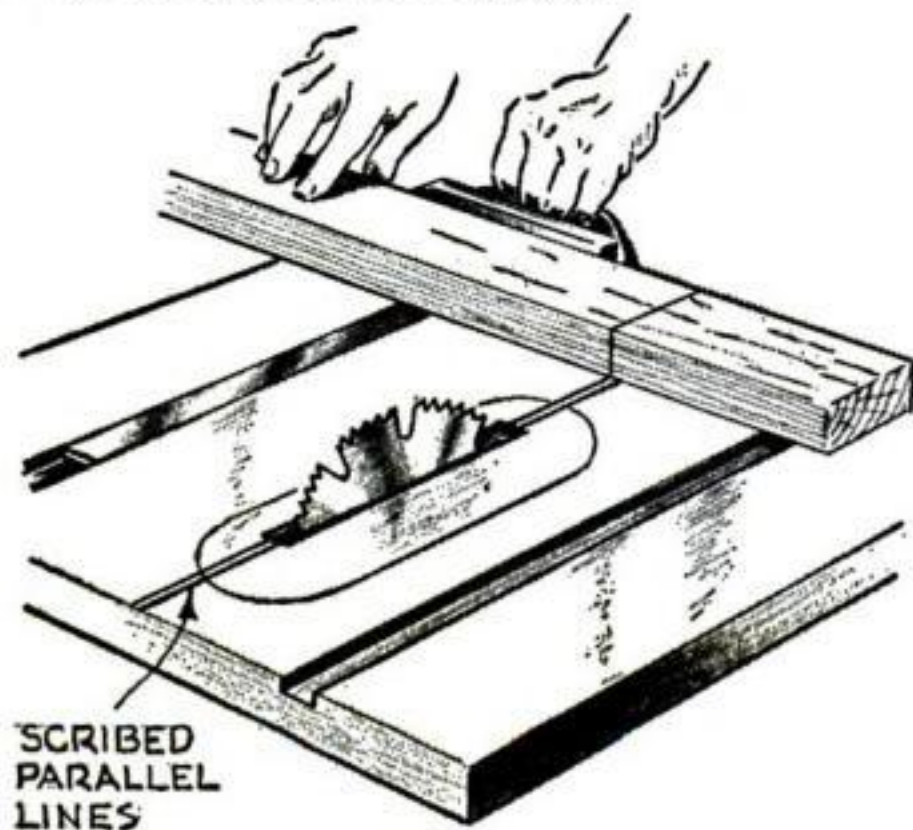
### Notch in Work Gives Hacksaw a Start When Making Angle Cut



It is sometimes difficult to start an angle cut with a hacksaw because the saw can't get a bite on the metal. I worked out a simple dodge to eliminate this annoyance. I notch the starting point with the corner of the file. This gives the saw a better purchase and keeps it from slipping off the work.—*W. M. Shutok, Uniontown, Pa.*

### Lines Show Blade Clearance

It's easier to saw pieces accurately on a table saw if you mark the table face with two parallel lines to indicate blade thickness. Scribe the lines by laying a carpenter's square against each side of the blade.—*J. A. Coombs, Philadelphia.*



### Tape Protects Cutting Tools

To prevent damage to the working edges and make sharpening less frequent, I wrap wood chisels, plane blades, even drills and scribers, with masking tape. I lay the tool at the center of a strip and fold the tape in half over the blade or the point.—*Robert Thomas, Ames, Ia.*



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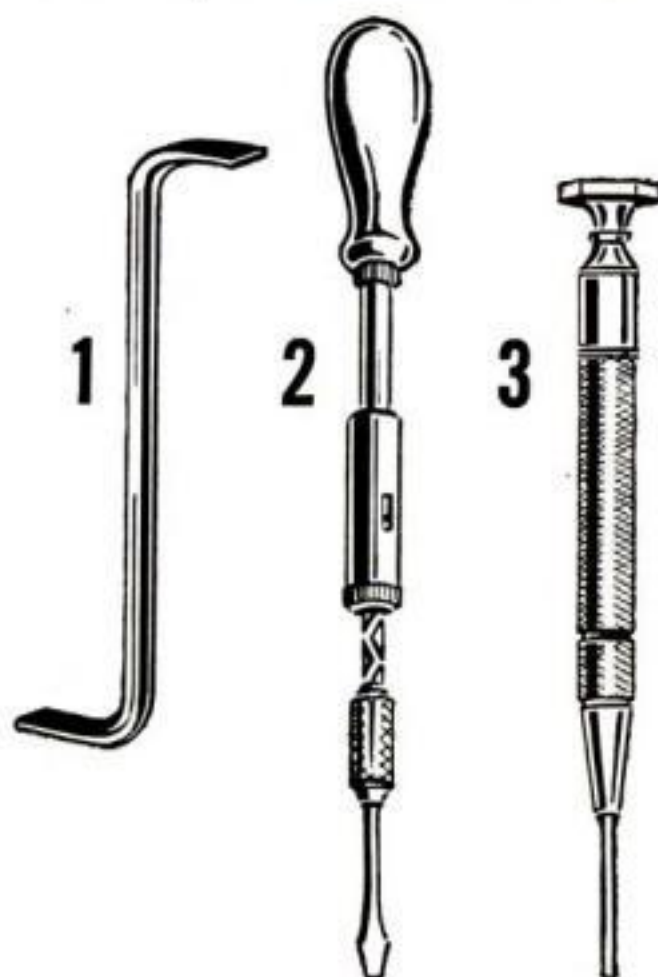


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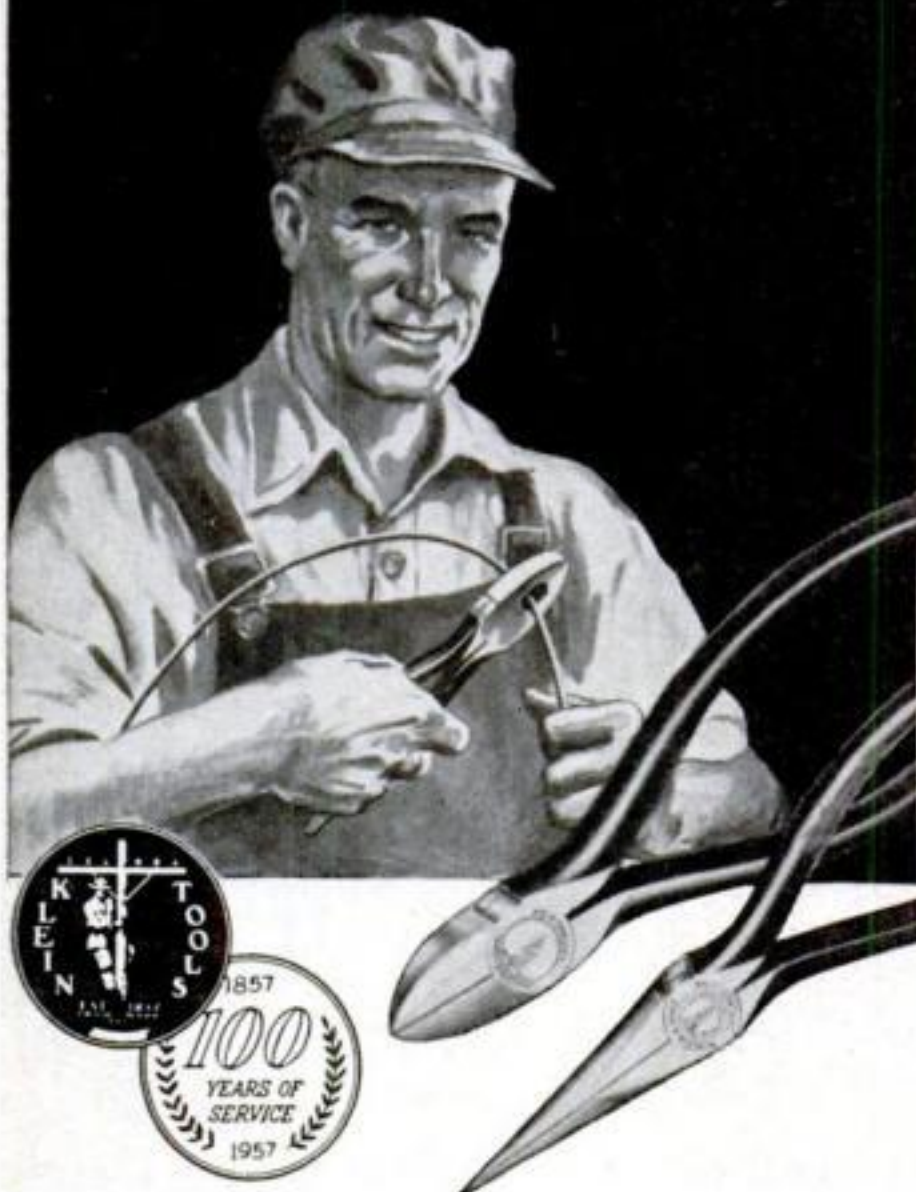
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## World's Meanest Flying

[Continued from page 56]

I went below. My nervous system isn't what it used to be, and a little of this sort of thing goes quite a way.

Let no one tell you Navy jet pilots are overpaid. Even USAF pilots (five were aboard), who normally won't give the Navy the correct time, huddled, shuddering slightly, behind an iron crane, as the planes made their touchdowns. Flying a jet fighter onto a carrier bears a distinct resemblance to making a high dive into a shallow tank.

**Tires popped like firecrackers** on the FDR cruise. One Grumman F11F snapped its whole right landing gear off like a toothpick on what seemed to be a normal landing, and went skittering down the deck in a shower of sparks. An F8U came unglued in the gear and burst into flame but the alert deck hands put it out in time to save ship and pilot. On the second day, one pilot broke his back because his F4D's nose slammed down when the tailhook caught a wire.

This sort of back injury, unfortunately, is not uncommon in jet-carrier operations. The planes come in nose high, at a steep angle of attack. When they catch a wire, the nose is naturally slammed down hard. Chance-Vought is putting frangible seats and special steel "give-straps" in their airplanes. The companies have finally built planes that can take more hell than the men who sit in them.

**Accidents are to be expected** on a cruise of this type, it was explained to me. Once the techniques of landing and taking off are perfected, these hot planes will make their carrier landings and take-offs with relative ease. And the F8U Crusader, once airborne, has tremendous performance. Captain Bob Dosé, skipper of VX-3, explained that this plane is what he termed a "breakthrough."

"I have to point my Crusader's nose upward at 60 degrees," Dosé said, "to avoid going through the sonic barrier on a normal climb. I can get to 50,000 feet in harummp minutes, and when I get there, there's no twiddling around. I just casually level off, and I'm supersonic right now! And turns. Man—you don't have to baby the U bird up in the stratosphere. Give her a shot of afterburner, and just go ahead and pull those G's."

[Continued on page 194]





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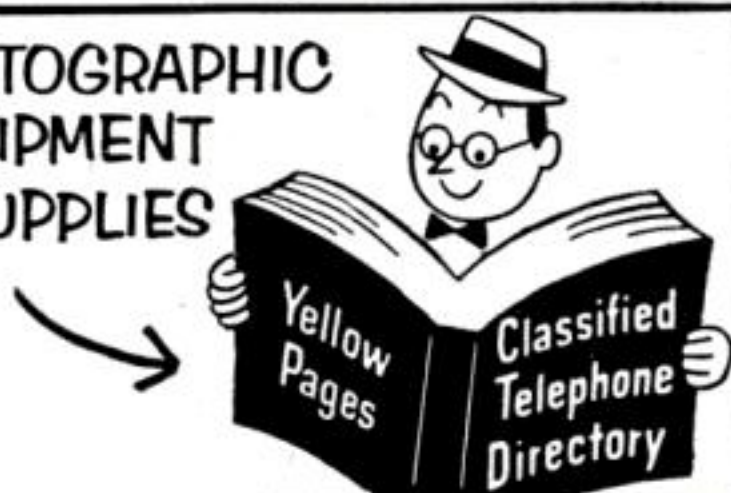
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## World's Meanest Flying

[Continued from page 192]

She's steady as a rock no matter how tight you want to go."

The Crusader, Dosé further pointed out, has something no other shipboard fighter can approach: four hours of endurance (if you really milk it). This means the F8U can range hundreds of miles away from the ship it is protecting (absolutely necessary in atomic war) and knock down enemy attackers before they get close. But the F8U-1 is a day fighter. It wouldn't be worth much at night or in a weather intercept. A new version, the F8U-3, which is reported to use a huge superpowerful engine and have all-weather radar, is now being worked on at top speed. Unofficially, it is reported to have a Mach 2—1,500 m.p.h.—capability.

At this point, however, you get to wondering how much further the Navy can go with supersonic speeds and controlled-crash landings. If these red-hot fighters are absolutely essential to sea power, then of course they must be built and brave guys must be found to fly them. But some people argue that the Navy is following World War II doctrine—using fighters to protect ships in a task force. That worked when our task forces had to be protected against carrier planes, launched far at sea by the Japanese.

**The Russians**, however, have no carriers. Fighter planes working in the Mediterranean, or in the Formosa Straits, would not stand a good chance against the swarms of land-based jets sent out after them in the first minutes of any full-scale war. At best they could delay the enemy for a short time. At worst, they would be taking up vital space which might otherwise be devoted to the Navy's superb twin-jet H-bomber, the A3D.

Many high-ranking Navy strategists are in favor of using carriers solely as launching platforms for the A3D, with every inch of space given to these sea-going long-range attack weapons. They'd stay in the open oceans, 500 miles from shore. The Strategic Air Command, admittedly, is the free world's main weapon. But SAC bases, at home and abroad, would certainly be visited early and often by Soviet bombers. Carriers steaming far offshore (too fast for submarines), and loaded with A3D's, might write different history.

END



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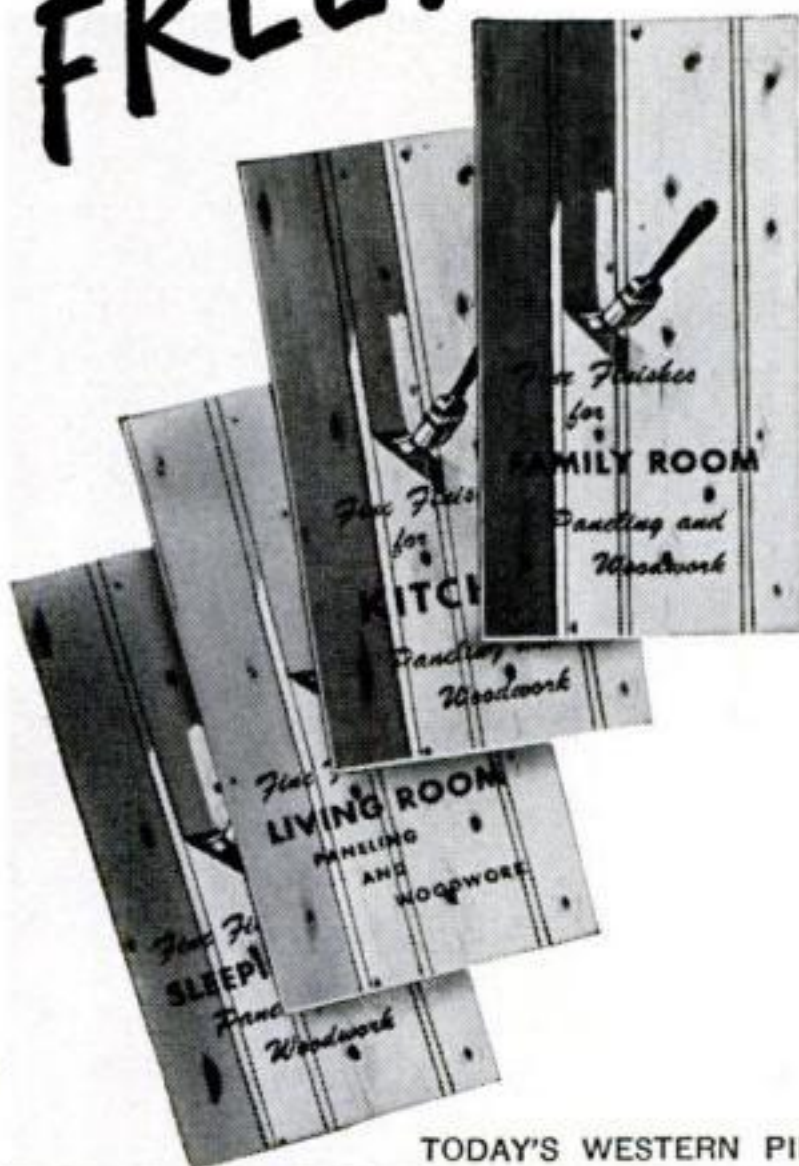
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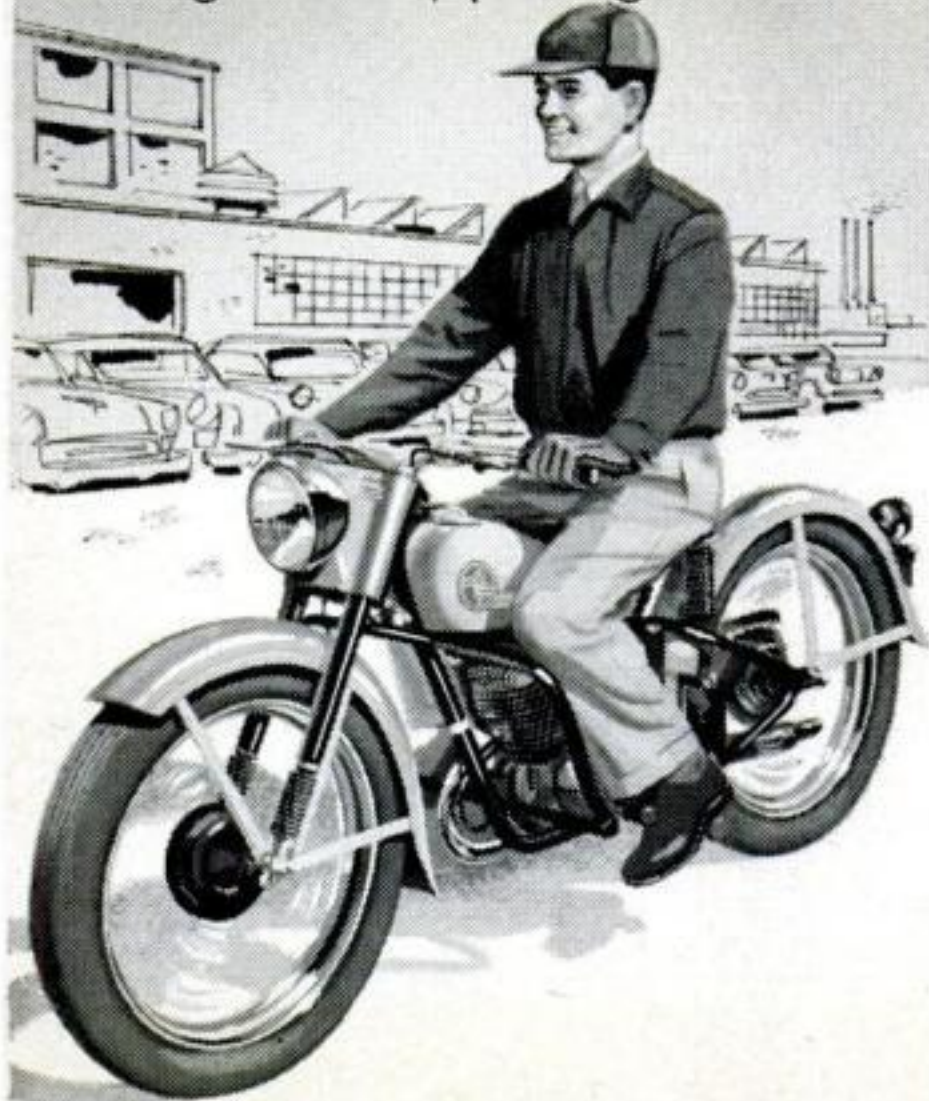
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### **Tomorrow's All-Purpose Radio**

[Continued from page 116]

ity you may be able to align the set without a signal generator, adjusting only the oscillator coil L2 and the trimmers C1A and C2A. But a better job can be done with a signal generator.

Perhaps you can borrow one, or take the set and the following instructions to any well-equipped radio serviceman. The circuit is so efficient when properly aligned that this is well worth what it costs. Misalignment may cost you some of its potentially excellent performance.

To tune the I.F. transformers, feed a 455-kc. signal through a .1-mfd. condenser to the base of TR1. With a fiber alignment tool, turn the adjustment screws on the underside of the transformers a little at a time, skipping back and forth among the three while watching the meter. It will read about .75 ma. with no signal, and should drop to as little as .3 ma. with a signal coming through and the transformers aligned. Keep reducing signal strength while tuning to hold the reading to about .5 ma.

R.F. alignment is made with the two ends of the signal-generator cable clipped together and laid near the loopstick. Turn the slug of L2 until it is about in the center of its coil, turn the condenser plates full out, and set the signal generator at 1,620 kc. Then adjust C2A (the trimmer on the smaller section of the condenser) to show the lowest meter reading.

Reset the generator to 1,500 kc., tune this in on the set, and adjust C1A (on the larger condenser section) for best signal. Rock the tuning condenser and readjust C1A for best reception. Next transmit a 600-kc. signal, tune the condenser to pick this up, and adjust the core of L2 to lowest meter reading. Rock the tuning condenser and readjust L2.

Repeat the entire sequence several times, adjusting L2 at the low end of the dial and the trimmers at the high end, to get peak tuning. Then touch up the I.F. cores again. Recheck R.F. alignment when the chassis and loopstick are finally installed in the case.

Use **hardwood plywood**  $\frac{3}{8}$ " thick for the top, bottom and sides of the cabinet, cutting either miter or simple butt joints. Glue these together with  $\frac{1}{2}$ "-square cleats

[Continued on page 198]



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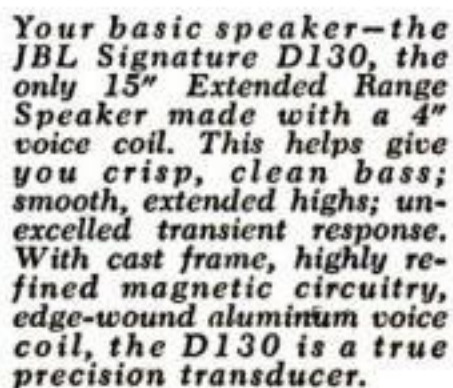
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.....

[Continued from page 196]

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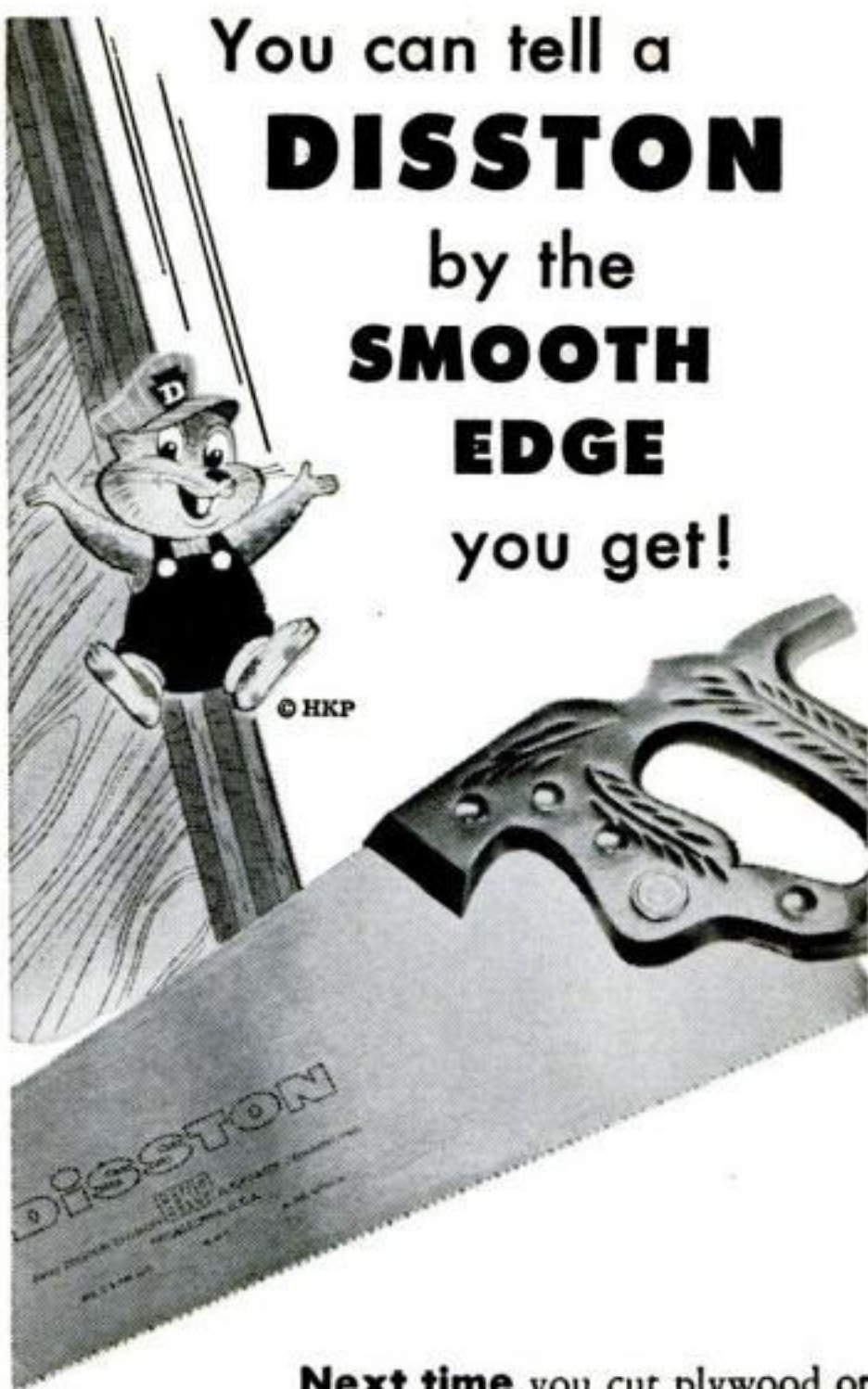
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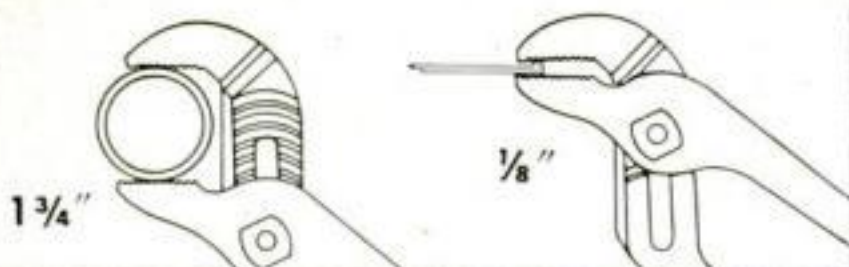
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## How Doctors Use Hypnotism Safely

[Continued from page 100]

cluding early infancy—or "progress" years ahead into the future. You can recall lost memories of past events, or relive them in the belief that you are actually experiencing them for the first time. Your visits to the future are, of course, fabrications based on your imagination. Your reconstruction of past events may also contain large hunks of imagination but are apt to have a factual basis. Bridey Murphy, for example, "relived" her lifetime in another century, weaving in details remembered in the trance state from tales about life in 19th-century Ireland which she actually had read and heard in childhood.

"The subject wants primarily to please the hypnotist," says Dr. Jacob H. Conn of the Johns Hopkins University School of Medicine. "Even when he is regressed to childhood he seems aware of the hypnotist's presence." Dr. Conn tells of a woman who went back to infancy under the influence of hypnosis. "I'm falling out of a highchair," she screamed. "Doctor, catch me!"

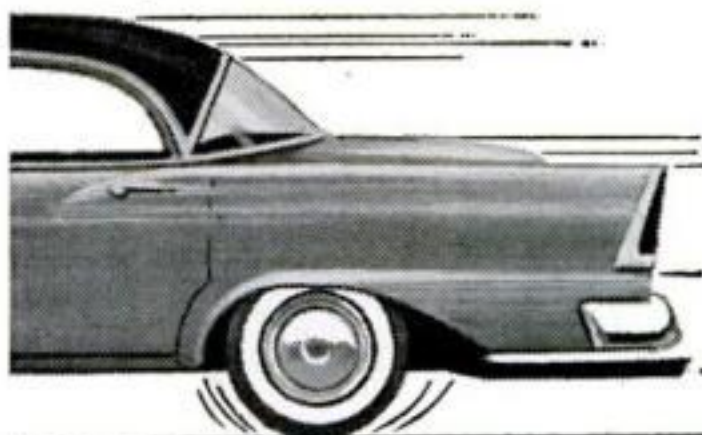
**I**N BOTH the medium and the deep trance, the doctor can implant in your subconscious mind desires and impulses that will influence your behavior after you come out of the trance. You feel these post-hypnotic suggestions only as an urge or drive to act or think in a certain way—without knowing why. If they are out of character, like the impulse to steal, or disrobe in public, or insult a friend—you may resist acting on them, at the cost of great inner tension.

It's easy to see why hypnotism often seems to work like magic in treating the so-called psychosomatic diseases—that is, physical symptoms that are caused or aggravated by a person's underlying emotional conflicts.

By putting the patient in a trance the doctor can make his suggestions almost irresistible. He tells a patient his headaches are going to disappear, and they often do. He tells an ulcer patient he isn't going to feel those terrible cramps, and he usually doesn't. Other ailments that respond dramatically to post-hypnotic suggestion are menstrual disorders, obesity, allergies, insomnia, tics, and a

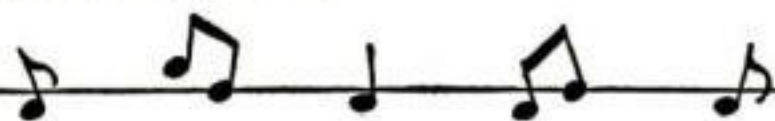
[Continued on page 202]





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## How Doctors Use Hypnotism Safely

[Continued from page 200]

variety of heart and gastro-intestinal disturbances.

**S**OUNDS wonderful? But medical authorities warn it isn't that simple. Hypnotic suggestion alone removes symptoms without getting at underlying causes. In some cases this may prove very useful. But only a doctor with psychiatric training should decide when to treat a symptom by hypnotism alone.

Unless the patient is given a thorough physical examination, there is always the chance that the aches and pains removed by hypnotic suggestion may be warning signals of appendicitis, cancer or some other condition requiring immediate medication or surgery.

On the other hand, if the symptoms really do represent a deep-seated emotional disturbance, removing them by hypnosis may be just as risky. The patient may stop expressing his anxiety through nail biting, migraine headaches, hypertension or what not. But as long as the underlying conflict remains, he will find some other and perhaps even less desirable way of expressing it.

Dr. Hugo G. Beigel of Long Island University tells of a doctor who treated a patient for severe headaches. "The patient was told in the hypnotic state that he would be free of it. Thereupon the pain disappeared from the head but reappeared immediately in the genital region."

**R**ECENTLY, Dr. Kline treated a 31-year-old man for an uncontrollable appetite that had suddenly developed three years before. The man went on eating binges that had sent his weight to an unwieldy 285 pounds. Dr. Kline traced the origin of the symptom to the time a dentist used hypnosis to "cure" the patient of bruxism (compulsive grinding of the teeth). When the patient's underlying anxiety couldn't find expression, it immediately found another outlet in compulsive eating.

Psychosomatic ailments and behavior quirks are defenses the patient has built up to protect himself against desires and impulses he cannot deal with openly. By putting him in a trance state he can be

[Continued on page 204]



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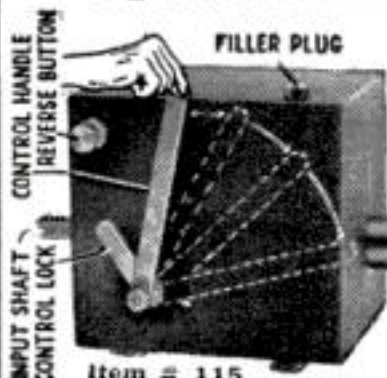
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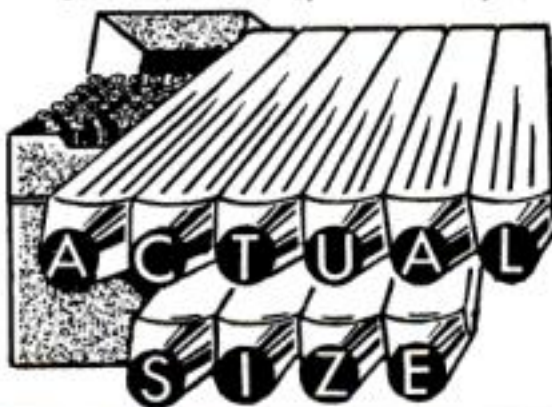
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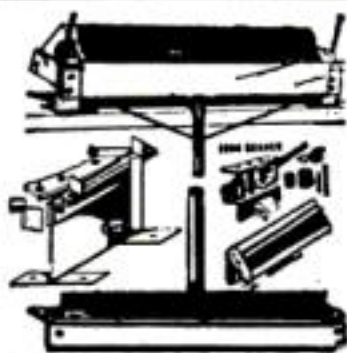
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## How Doctors Use Hypnotism Safely

[Continued from page 202]

made to recall and even relive these guilt-ridden urges. But this is a very tricky business; if it is done without great skill it may completely destroy the patient's shaky adjustment to life.

Dr. I. S. Dribben, chief of the neuro-psychiatric section of an Army hospital during World War II, tells of a G.I. who was brought in suffering from amnesia, confusion, excitement and incoherence as a result of having been hypnotized by another enlisted man who could not remove him from the trance. This is typical of many cases of personality disturbances precipitated by unqualified hypnotists.

**HYPNOSIS** itself is not a treatment; it can seldom help a patient, and it may do harm. But the use of hypnosis in the course of administering treatment may be very helpful, depending, of course, on the ability of the doctor to deal with personality problems. Most leading authorities on medical hypnosis feel that only doctors and dentists with psychiatric training are qualified to use it.

The very qualities that make hypnosis dangerous for the amateur and the unqualified practitioner make it an instrument of great value for the psychiatrist and, in some cases, for the psychiatrically trained doctor or dentist. Instead of spending months or even years analyzing the patient's hidden conflicts, the experienced hypnotherapist can get at them at once, and gradually bring them to the conscious level where they can be handled with reason and common sense.

Apart from psychotherapy, hypnosis has found its greatest usefulness as an accessory agent in anesthesia for surgery and childbirth. The chemical anesthetics are depressants that put a strain on your heart, lungs, liver and other vital organs.

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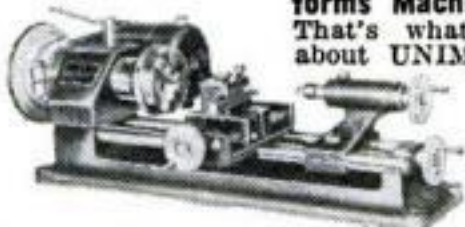


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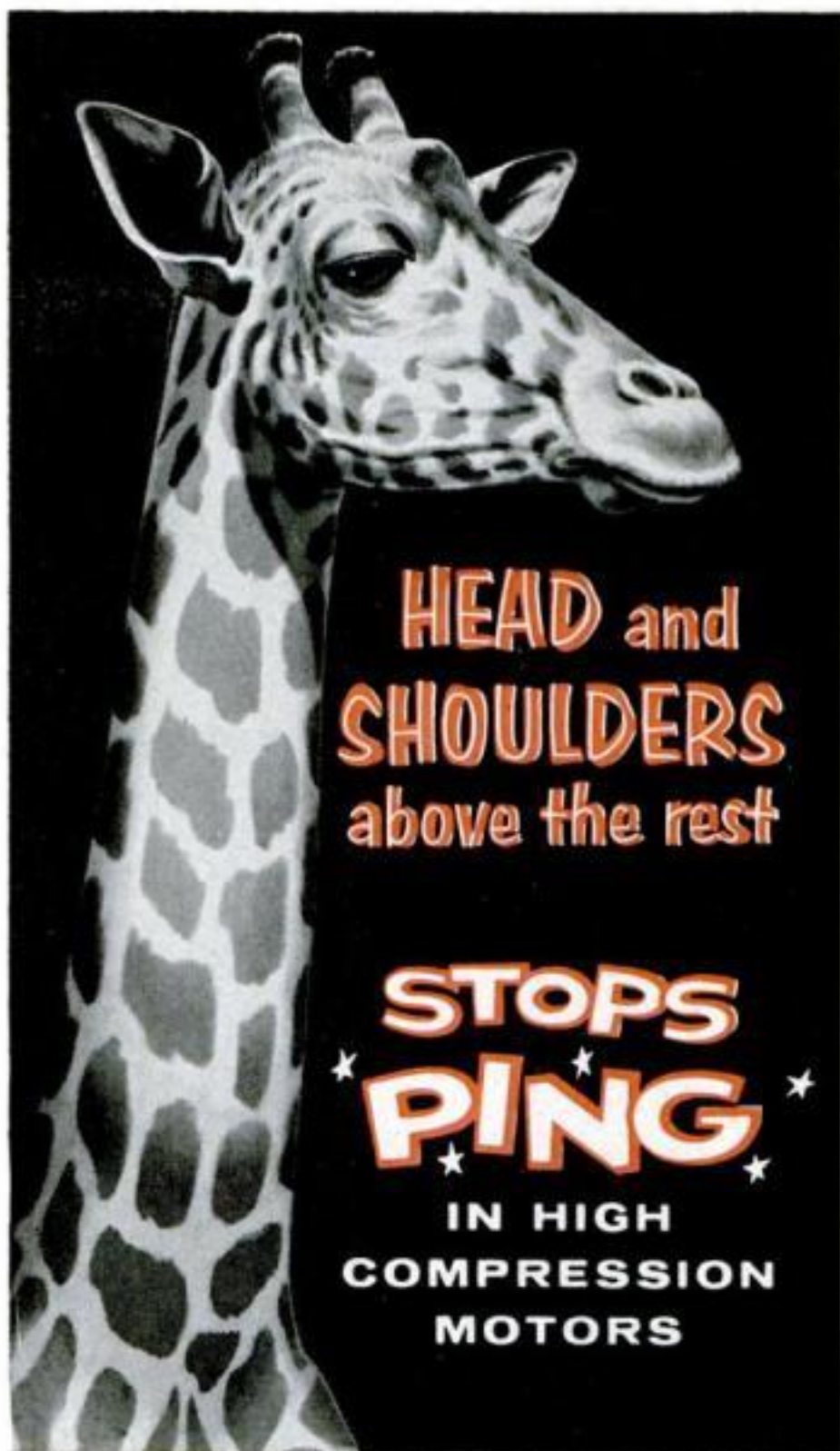
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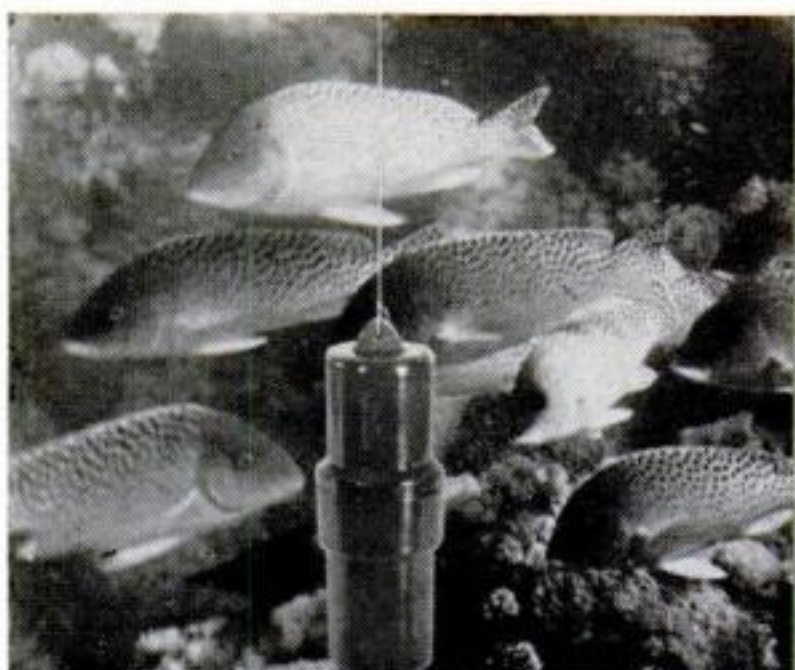
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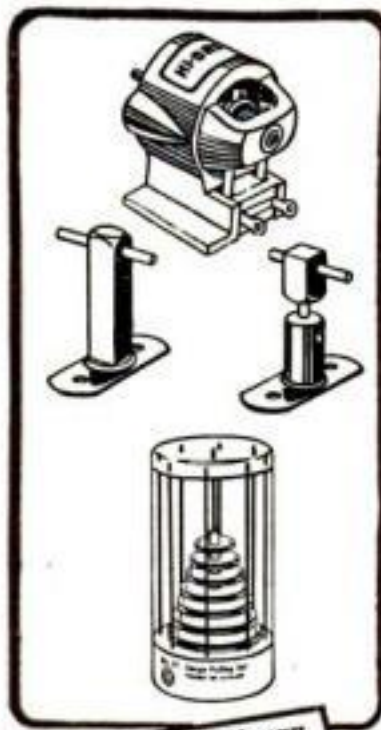
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[Continued from page 66]

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A variation of this is swing casting, in which the bucket is sidecast as the boom swings from the dumping point back to the work pit. By casting, the dragline can work beyond the end of its boom.

**First cousin to the dragline** is the clamshell (Page 61, No. 5), whose two-jawed bucket can dig straight-sided holes to a depth limited only by cable lengths. It can handle boulders, loose brush, stumps and logs, mud, soil or gravel.

**Cranes give a lift** in the placing of structural members, for which they may have booms 200 feet high. Road builders are more likely to use truck-mounted ones, with shorter booms, for laying bridge girders and hoisting concrete buckets (Page 62, Nos. 4, 5). With accessories, a crane may become a dragline or pile driver.

Watch that boom angle as you see a crane, shovel or dragline at work. If it's too low, the load may tip the machine forward—the balance point is at the front of the tracks or wheels, and if a load overbalances, an operator is in trouble.

Best stability is gained with the boom high and load close in. But let an operator raise it too high, or swing from a downhill to an uphill direction when it's already high, and the boom may fall back on the shovel.

If he swings a load fast, its weight is increased enormously by centrifugal force, perhaps to the point of tipping the rig. Should he try to stop, the swinging weight may do even worse. Best answer is to lower the load while letting the shovel coast on the swing.

The fellows running boom machines must beware of kilowatts too. Hitting electric wires is an occupational hazard of po-

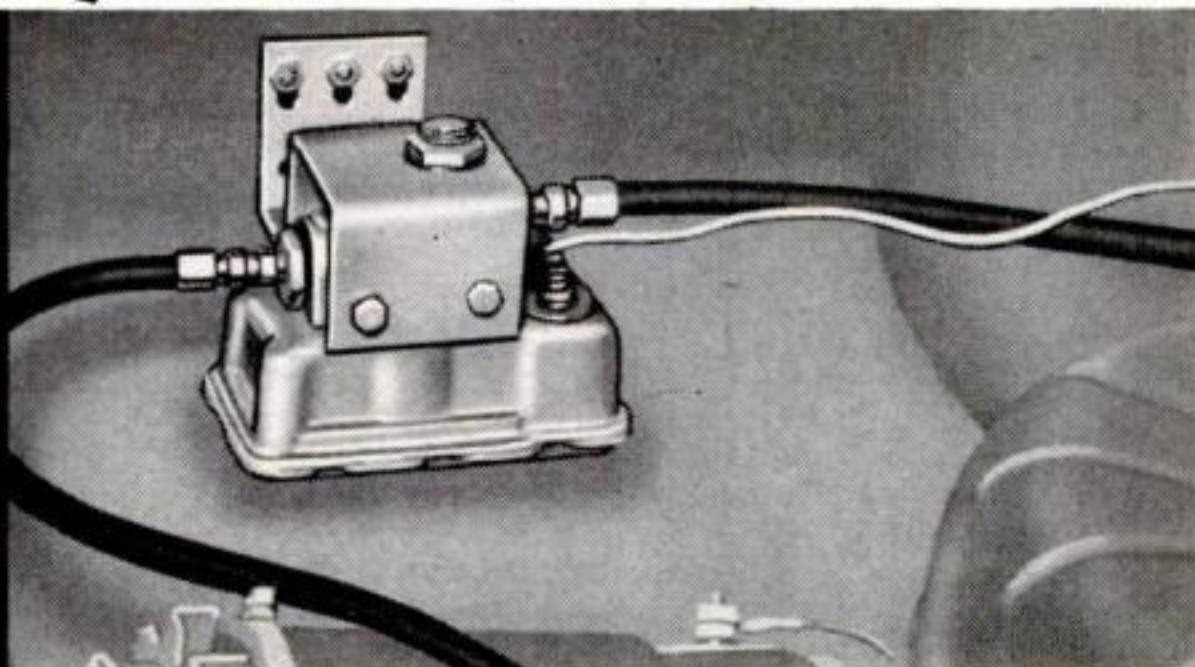
[Continued on page 208]



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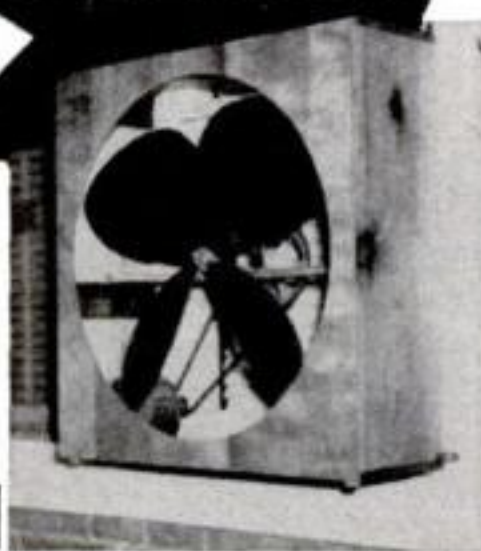
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The one-room house pictured above is built with Homasote beveled siding, subflooring, walls and ceiling. All materials and complete building instructions are listed on Easi-Bild® Pattern #84—available at your lumber dealer. This pattern details each step of the job, with photographs, cut-away drawings, and full-size sawcut patterns to make every inch of the job professional.

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\*T. M. Reg. Easi-Bild Pattern Company



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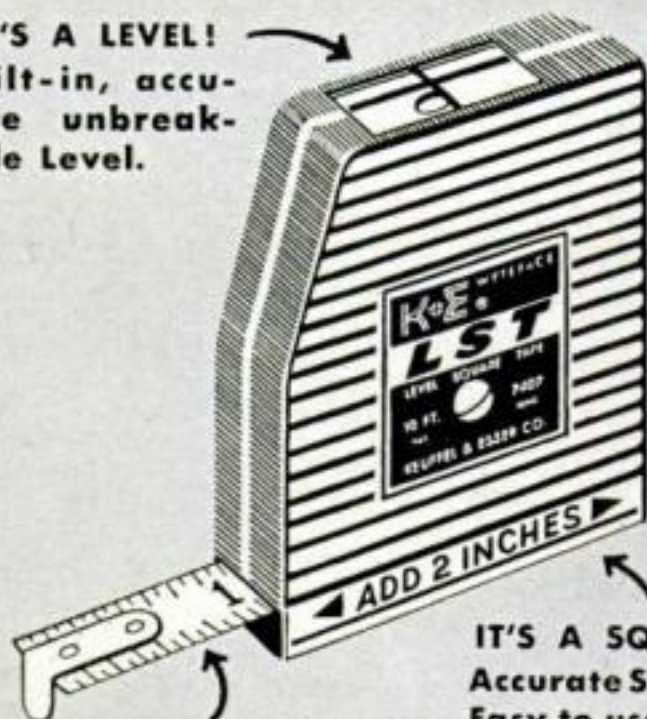
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**KEUFFEL & ESSER CO.**  
Hoboken, N. J.

## The Machines That Build Our Roads

[Continued from page 206]

tential drama. Until the juice is shut off, the operator has to sit tight or else jump clear in such a way as not to touch any part of his rig and the ground simultaneously.

**Scrapers dig and dump.** They are both excavators and haulers (Page 58, No. 3; Page 59, Nos. 10, 11, 12), capable of carving a roadbed out of a slope, leveling humps and valleys, building up an embankment or notching a path between hills. A modern scraper with a tractor to push-load it can move up to 250 yards of earth per hour.

It works this way: A knife-edge is pulled through the ground, usually six to eight inches below the surface. The plowed-up material is carried back by the machine's movement into a bowl or pan. Then an apron closes the bowl and the machine scoots away at speeds up to 30 m.p.h.

The load is ejected by tilting the bowl or moving the tailgate forward. It can be spread with precision on the run, to any desired depth.

Basically all scrapers are trailers—they have to be hauled by a power unit. Some, with four wheels, are meant to be pulled by a crawler tractor. But the faster, more maneuverable ones have their own two-wheeled tractor, with two rear wheels to carry the bowl.

There's a twin-engine scraper with a 300-hp. tractor and a 218-hp. engine driving the rear wheels. The two engines are synchronized, and under favorable conditions can load the 24-yard bowl without pusher help.

**A scraper bowl is big**—roughly the size of a small bedroom. Capacities now run up to 32 yards, may soon go to 40.

On the job, the scraper lines itself up where material is to be removed, while a pusher tractor nudges up behind it. The apron is opened, the bowl dropped to the desired depth of cut, and both its own engine and the pusher's are run full throttle to load. Dirt boils up over the blade, tumbles into the bowl with a rolling action. The effort is tremendous but brief; loading takes little more than a minute.

**Graders finish roadbeds** by pulling a precisely controlled blade over them (Page 61, No. 11). The modern grader is a marvel of control—the blade can be set at any



## The Machines That Build Our Roads

angle to the direction of travel, raised or lowered to a hair's breadth (in one machine, the blade is automatically controlled by electronic devices). Wheels can be leaned to avoid obstacles or resist blade thrust, and even steered diagonally.

**Trucks move the earth** in 40-cubic-yard chunks, but you won't often see these monsters on the road. They're too heavy and too wide (12 feet) for most highways. Some off-the-road haulers are four-wheeled wagons, pulled by tractors. They may dump from the rear or the bottom. Others, with their own power unit, eject by drawing their rear wheels up toward the front ones, like a cat arching its back.

These earth-moving monsters are not merely beefed-up trucks. The LeTourneau L-W Thirty, for instance, carries the load on air pistons instead of springs, does away with axles in favor of individual wheel suspension.

The showiest of the new haulers is the LeTourneau Electric transporter. This six-wheeled monster has a 335-hp. diesel driving a generator. Each six-foot tire is driven by its own electric motor. This hauler can bull its way through a forest, climb a 40-percent grade with 70,000 pounds on its back, and wade through waist-deep mud.

**These are the stars**, but there are a lot of supporting players. Loaders—portable belt conveyors—keep trucks full. Wagon drills sink holes 40 feet deep in rock for blasting. Fill is tamped firm by weighty compactors. Some have smooth rollers, some grid rollers like a mesh of steel bars, and still others hundreds of steel knobs like sheep's feet.

Star of the final act in the big road show is paving equipment. Machines the size of a six-room house take in cement, sand and aggregate, measure it, mix it and pour it between the forms. Similar batch-mix plants lay asphalt roadway, iron it flat, and compact it.

Concrete finishers (Page 63, No. 10) ride the steel forms, spread the mix, form expansion joints. Some even texture the surface with a broom on an endless belt.

**That plane overhead?** It's probably flown by the project engineer. From the air he can see how the job goes, where he'll put men and machines tomorrow. For road work is constantly on the move, and the big show must go on. **END**

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use ALCOA ALUMINUM NAILS



WHY RISK THIS



WHEN YOU WANT THIS

NAILPOX is the staining that results when nails rust.

You can prevent nailpox by using Alcoa® Aluminum Nails. They can't rust or cause unsightly rust stains. They need no countersinking or puttying. Paint lasts longer. Make sure builder uses them, and use them on jobs that you do yourself. Alcoa Aluminum Nails are available from your local hardware, lumber or building supply dealer.

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Yet anyone can operate this new Rod-  
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Another new unit is the Miller Electric  
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SAVED**. Tear this Ad out—and write your  
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## Helping Your Youngster Pick a Career

[Continued from page 79]

about 30 percent in the past decade and  
promises to grow another 25 percent in  
the next decade. Many journeymen be-  
come independent contractors.

Number of jobs: a million carpenters,  
300,000 plumbers, 450,000 painters, 340,-  
000 electricians, 225,000 operating engi-  
neers (such as bulldozer men).

Pay: very good—\$3.18 an hour for  
union carpenters, \$3.69 for bricklayers.  
The work is not steady, however, depend-  
ing on weather and business activity.

Training: High-school vocational  
courses are helpful, and some mathemat-  
ical ability is necessary. Apprenticeship  
programs lasting three to four years are  
operated by many unions and employers.  
Last year some 103,000 young men were  
being trained this way.

**Machinists.** The fast-growing metal-  
working industry will require versatile  
men who can operate all kinds of ma-  
chine tools and read blueprints. Oppor-  
tunities are good for advancement to fore-  
man or to the star job of tool-and-die  
maker (some take home \$9,000 a year).

Number of jobs: about 600,000 ma-  
chine-tool operators, with a 25-percent in-  
crease expected over the next 10 years.

Pay: In Detroit, maintenance machin-  
ists average \$2.65 an hour; job-shop tool-  
and-die makers get \$3.15. The work is  
steady.

Training: science, mathematics and vo-  
cational courses in high school, plus  
specialized instruction in trade school  
or apprenticeship. Last year there were  
about 30,000 apprentices.

**Repairmen.** Machines in homes, fac-  
tories and offices keep getting more and  
more complicated, which means that great  
numbers of skilled experts are needed to  
take care of them. Good men have plenty  
of chances to advance within a company  
or to go into business for themselves.

Number of jobs: several million. There  
are 40,000 men specializing in the repair  
of office machines alone.

Pay: Automobile mechanics in the De-  
troit area average \$2.37 an hour. A na-  
tionwide employer of TV repairmen pays  
journeymen \$100 a week. Senior mechan-  
ics for a major airline get \$2.65 an hour.

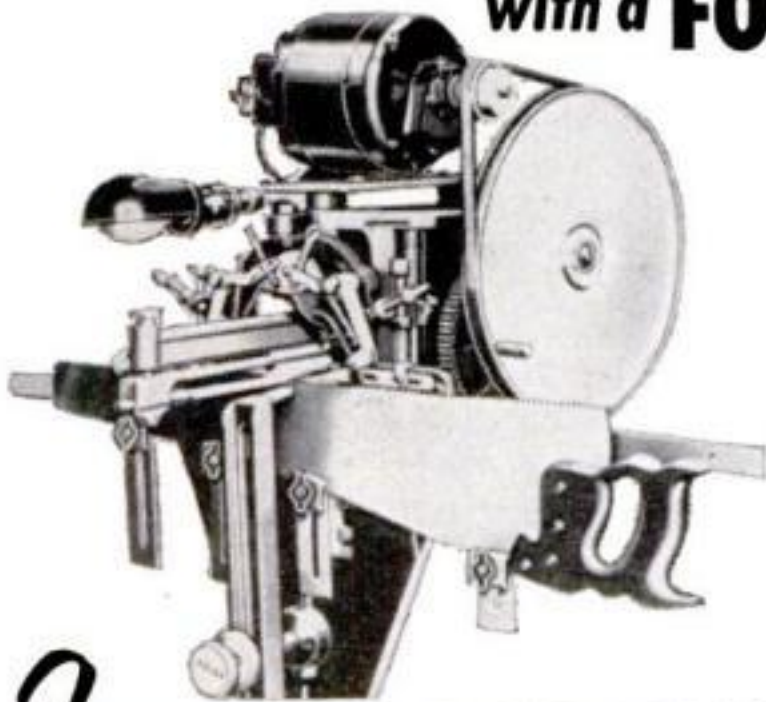
Training: science, mathematics and  
vocational courses in high school, plus

[Continued on page 212]



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"Last year's profit amounted to \$3,000. Not so bad for a one-man outfit"—from Chas. C. Hough. James B. Williams wrote us—"I made \$765 last year filing saws, and it sure comes in handy. I do this work in my spare time." Men in communities of all sizes make up to \$3 or \$5 an hour with the Foley Saw Filer working full time or part time.

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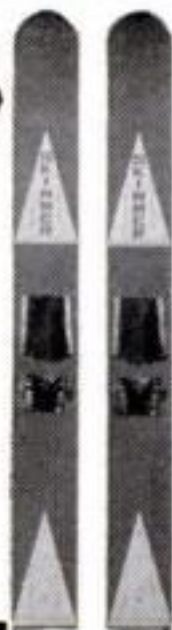


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### .45 U.S. ARMY COLT AUTO.



The official sidearm of the U.S. Army. A \$74.50 value. These are rare surplus items these days. **OUR AMMO SPECIAL:** 50 rds., \$2.50.

**TO ORDER:** Send check, cash or m.o. 1/4 dep. for C.O.D. Don't forget, add \$1 for extra rifle, 10-day MONEY BACK GUAR. Calif. resid. add 4% state tax. **SHIPPED FOB LOS ANGELES.**

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1206 Maple Avenue, Los Angeles 15, California **BRAND NEW**

## Helping Your Youngster Pick a Career

[Continued from page 210]

specialized instruction in trade school or from correspondence courses. There are some apprentices—10,100 in the auto field.

**Technicians.** This is a relatively new occupation for young men and women who have a combination of mechanical skill and book learning that fits between engineer and craftsman. The group includes engineering aides, lab assistants, chemical technologists and draftsmen.

Number of jobs: several hundred thousand, including about 140,000 draftsmen. Estimates of the number needed range from a half-million up.

Training: science, mathematics and vocational courses in high school, plus specialized instruction in a one or two-year technical institute or junior college, or from correspondence courses.

Pay: Senior draftsmen average \$110 a week; X-ray technicians (women) \$63.

**Nurses.** Hospitals are begging for full-time nurses, and there are many opportunities for part-time work after marriage.

Number of jobs: 430,000, with about 60,000 to be filled each year.

Training: science courses in high school, plus two to five years' training in a nursing school.

Pay: General-duty nurses average about \$70 a week.

**Office workers.** This is a very large field that should expand by another 25 percent in the next decade. Two-thirds of the workers are women. The turnover rate is high so that there is always a chance for a trained girl to find a job.

Number of jobs: 9,000,000.

Training: Business courses in high school may be enough, but the better jobs go to graduates of the one- or two-year business colleges, and still better ones go to the graduates of four-year colleges.

Pay: Stenographers average \$68 a week, women bookkeeping-machine operators \$75, and men accounting clerks \$95 (college-trained accountants make more). The pay varies considerably with location; it's much higher in Detroit than in New Orleans, for example.

**Salesmen.** The Government classifies 4,000,000 people as "sales workers," but that includes everybody from girls behind a dime-store counter to expense-account

[Continued on page 214]



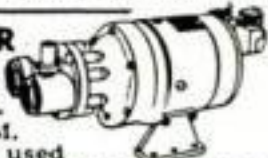
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**MICROMETERS** Chrome plated, precision engineered, carefully tooled to give long life. All new 0-1" cap. \$2.50 ea. 1-2" cap. \$3.75.



## DOUBLE ACTION HYDRAULIC CYLINDER

Will lift 7000 lbs. with 1000 P.S.I. line pressure. Can go to 3000 P.S.I. Micro-honed & all stainless steel 1 1/4" dia. piston rod. Stainless steel shaft. Rugged construction. Clevis mounting. 4" bore, 22 1/2" stroke, overall length 43", shaft dia. 1 1/4". Weighs 14 lbs. Approx. GOVT. COST \$475. NEW. \$32.95.

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MICRO-MIDGET RACING is America's fastest growing sport. Now anyone from 18 to 60 can own a real racing car and have all the thrills and excitement of speedway racing. You can't imagine how much downright actual fun it is to drive a Micro until you try it for yourself. There's a thrill to driving a Micro-midget that nothing else can equal. The new 1957 COMET is the ultimate in Micro-Midgets and has no equal. Breathing acceleration, precision control plus outstanding body styling and workmanship all combine to make it the best performing and most beautiful small racing car ever built. SEND 25c FOR ILLUSTRATED LITERATURE DESCRIBING ALL DETAILS OF THE 1957 COMET

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Write now for free booklet and pictures of rupture care. You can be helped...work steady, with low cost, easy to wear Web Truss, thousands satisfied.

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By using easy to apply Behr-Lac you get a tough, clear finish that defies stains and abuse, get BEHR LAC. This new resin-free coating dries fast and satin smooth. Brings out the true natural wood color and grain. Terrific for protecting and beautifying new or old furniture, wood paneling, etc. Order

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"Faster-than-the-eye-can-see." Will be the center of conversation wherever shown. Extremely dependable and effective as a hunting or fishing companion for urgent situations. Direct import. Heavy steel blade, bone handle. Authentic, unchanged from unique design which has intrigued Sportsmen the world over. POSITIVE LOCK, open or closed. SEND check, cash or M.O. Calif. resid. add 4% state tax. Sorry no C.O.D.'s. Satisfaction guaranteed. This offer good only where not prohibited by local laws.

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REGULAR (5 9/16" opened).....\$5.50  
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COLOSSAL (13 1/4" opened).....\$8.95





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**HOLT'S ORIGINAL**  
**Piston Seal**

*it's Easy*

**\$4.95** Tube for most cars



does help in  
**6**  
important ways

- 1 - reduces oil consumption
- 2 - restores compression
- 3 - stops piston slap
- 4 - increases miles per gallon
- 5 - improves performance
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20 years on the market. No one else can claim this. Effective interim treatment for worn cylinders. Forms self-lubricating seal around pistons. Lasts for thousands of miles. Get yours NOW. Delay is costly.

Ask for Piston Seal at nearest garage or auto store . . . or

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Fanwood 135, N. J.

TRADE MARK REGD.

Write for full details

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**STOP FRONT DRIVE WEAR**

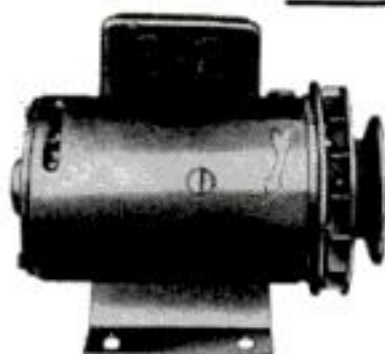


Over 100,000 Warn Hubs are now in use, proof that free-wheeling 2-w.d. with Warn Hubs means big savings in gear, engine, tire wear, gas, plus more pep, performance, power in high and easier steering. Now, with Warn Lock-O-matics, you have economical, drag-free 2-w.d. or tractive 4-w.d. automatically, as you shift! Ask your local 4-w.d. dealer to install Warn Lock-O-matic or Locking Hubs today. Fully guaranteed. Write for free literature.

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60 Cycle, Single Phase, Continuous Duty



750 Watt Cost \$115.00 **\$59.50** PPD.

1000 Watt Cost \$150.00 **\$79.50** PPD.

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Ideal as a permanent or stand-by unit for electricity IDENTICAL to house current. Perfect for farms, camps, aboard ship, oil fields, mines, etc. Easily handles lights, refrigerator, deep freeze, oil burner, radio; power for saw, floodlights, drills, pumps, etc.

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**Helping Your Youngster Pick a Career**

[Continued from page 212]

aristocrats who peddle electric-generating plants. The pay and the prospects for sales people with no special training are poor.

Quite the opposite is true for sales people with expert knowledge of a complex product. Real-estate and insurance salesmen (state licenses are required in each case) are doing very well. A survey by the American Chemical Society indicates that chemical engineers who work in the sales end of the business make more money than their fellow graduates who work in the engineering departments.

**Engineers.** Number of jobs: 625,000. That's twice as many engineers as there were in 1940—and it's still not enough. About 40,000 additional jobs open up every year and the supply is not likely to match the demand for many years.

**Training:** four or five years at engineering college. Advanced degrees are increasingly necessary for promotion.

**Pay:** Average salary is around \$5,000 a year to start, but regular raises bring it close to \$10,000 after 20 years' experience, where it levels off.

**Scientists.** Number of jobs: 235,000. The demand, particularly for young men and women with limited training, is not so great as for engineers.

**Training:** Four years at a college of science entitles a young man or woman to call himself a scientist, but a doctor's degree (at least three additional years of study) is practically essential for advancement in this field.

**Pay:** Average is about \$6,500 a year.

**Teachers.** This inspiring profession is by far the largest of all, and it's getting bigger every year.

Number of jobs: 1,200,000 teachers in primary and secondary schools, with 1,900,000 needed over the next 10 years. There are 160,000 college teachers: twice that many, it is estimated, will be required in 15 years.

**Training:** Four years in a teacher's college are usually enough, but many cities require a master's degree for high-school jobs. Advanced degrees are practically essential for promotion.

**Pay:** fair now, but improving. Teachers average less than carpenters, but can supplement their incomes with other work during the long summer vacation. **END**



# New! VISE-GRIP with *EASY* Release!

Model 10WR, 10"

Only \$2<sup>95</sup>



PRESS HERE  
...and Jaws  
**CLICK** open!

*EASY* does it! Now, world-famous Ton-Grip instantly released. Makes Vise-Grip better than ever as the quickest, easiest tool for every gripping job. 7" and 10", cutter optional, \$2.15 to \$2.95. Get the new Vise-Grip—you'll love it!

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### BE FREE FROM TRUSS SLAVERY

Now there is a new modern Non-Surgical treatment designed to permanently correct rupture. These Non-Surgical treatments are so certain, that a Lifetime Certificate of Assurance is given.

Write today for our New FREE Book that gives facts that may save you painful and expensive surgery, and tells how non-surgically you may again work, live, play and love and enjoy life in the manner you desire. There is no obligation. Excelsior Hernia Clinic, Dept. 3705, Excelsior Spgs., Mo.



## Used perfect HOIST and WINCH

Eliminates Backbreaking Ordeals... Small but Mighty. Made to be used on B-29's for lifting bombs. 2,000 lb. capacity. Wgt. 16 lbs. Perfect for lifting or moving loads in trailers or auto trucks, tractors, on any other movable machinery. Fine for garages, implement stores, warehouses, assembly lines, contractors and many other uses. Original cost, Appr. \$200. Our price FOB KC... \$24.50. Satisfaction guaranteed... Mounting Bracket... \$4.50 extra

SPECIAL: Portable 4" SPOT LITE (Navy)—Sealed beam; pistol grip. 4500 candle power. Fits 12 V. systems for cars, boats, etc. only... \$4.00

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EASY TO BUILD—Designed for the amateur. Over 200

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the whole family can enjoy their favorite program from one antenna



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**\$3.00**  
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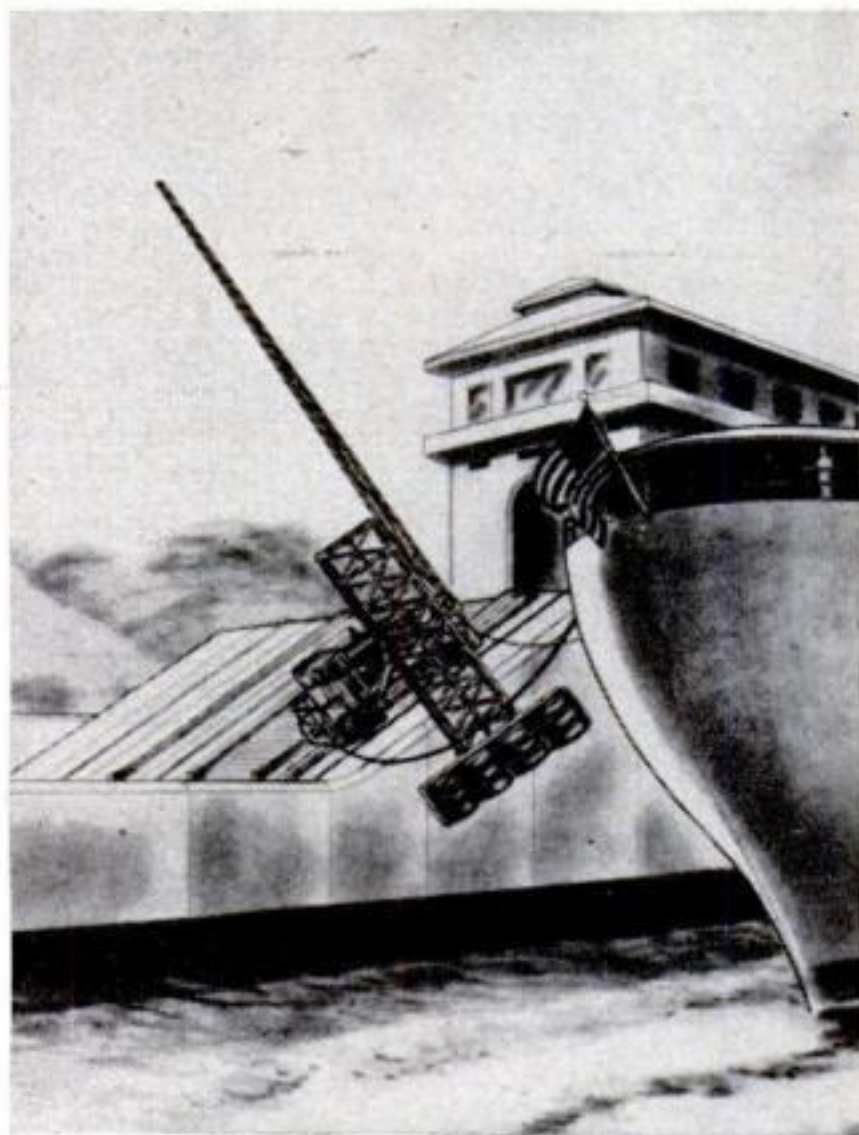
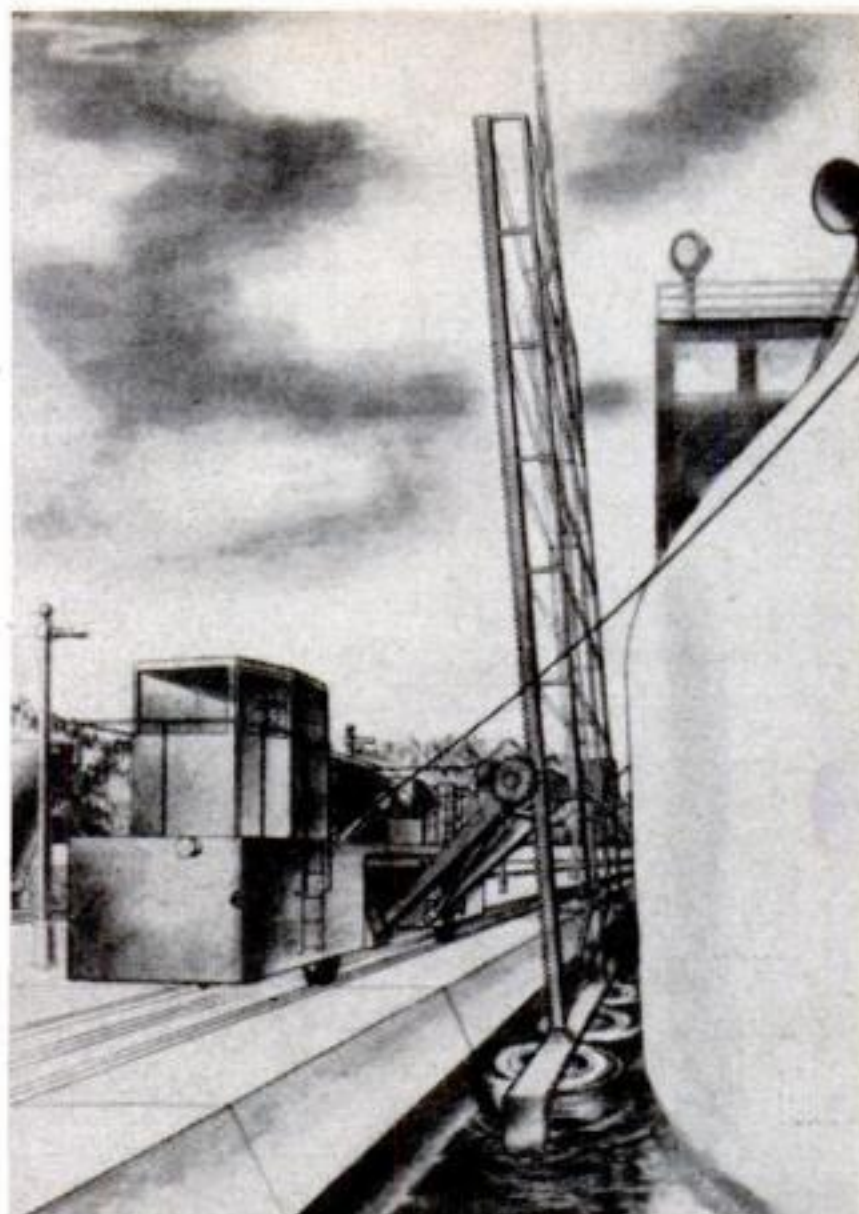
He-man trophies for Den, Rumpus Room, Cabin, Etc. Absolutely safe—Cannot be fired

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**FREE** INSURANCE POLICY given with each used tire sold. We guarantee the amount of service you pay for.  
NOWHERE CAN SUCH QUALITY BE FOUND AT SUCH LOW PRICE!

**SPECIAL!**  
Deduct 10% on orders for two or more used tires

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600x16	\$3.65	670x15	\$3.95
650x15	3.85	670x16	4.05
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600x16	\$5.25	670x15	\$5.45
600x16(6)	6.75	670x16	4.95
650x16	5.75	670x15	5.35
650x16(6)	7.25	710x15	5.45
700x16	6.35	760x15	5.95
750x16(6)	8.45	800x15	6.35
550x18	4.95	820x15	6.35
550x17	4.75	550x15	5.35
650x15	5.25	670x16	5.15
700x15	5.35	700x16(6)	10.25
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Whitewalls \$1.00 extra.

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- Airtight compartments prevent sinking.
- 14 Ft.—Holds 4 Adults.
- Leakproof, 16-gauge all-steel construction.

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From Junked Refrigerators for a Few Dollars  
INSTRUCTION BOOKS SHOW YOU HOW... 75c EACH

Special Offer  
2 Bks - \$1.00  
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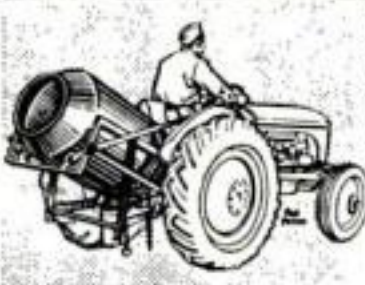
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Finest power for racers, scooters, lawnmowers, garden tractors—any job within their capacity—is one of today's Red Seal heavy-duty air-cooled models. They're built to get up and go, and backed by engine experience dating from 1902. Greater piston displacement gives power in excess of rating, plus low-speed lugging ability that eliminates stalls. Exclusive Contex ignition system speeds and simplifies adjustment, doubles life of points and plug. Optional low oil level ignition cutoff ends hazards of running dry. NOW AVAILABLE with built-in flywheel generator for charging batteries or lighting lights. For name of Red Seal dealer nearest you, write TODAY.



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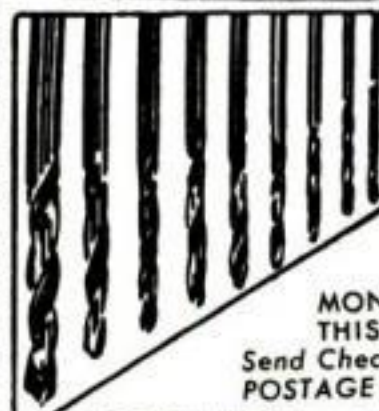


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For hand or electric drills. Brand new, genuine hardened carbon tool steel drills from 1/16" through 1/4". Each drill designed and tempered to give many drillings through steel, aluminum, iron, wood, plastic. Sells in the stores for up to \$6. Complete set postpaid... **\$2**

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Flat Nose, Round Nose, Diagonal, End Cutting Nippers, 1 Side Flat-1 Side Round, Snipe, Combination For Jewelers, Optical Workers, Hobbyists. These German instruments are of deep-forged, heat-treated high quality tool steel, fabricated to most exacting specifications. All-over ground, polished to smooth hard surfaces. Smooth working joints with right tension. Jaws meet perfectly to securely hold the most delicate objects in hard-to-reach corners and angles. Each plier is 4" long.

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**Science Finds Healing Substance That  
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For the first time science has found a new healing substance with the astonishing ability to shrink hemorrhoids and to relieve pain—without surgery.

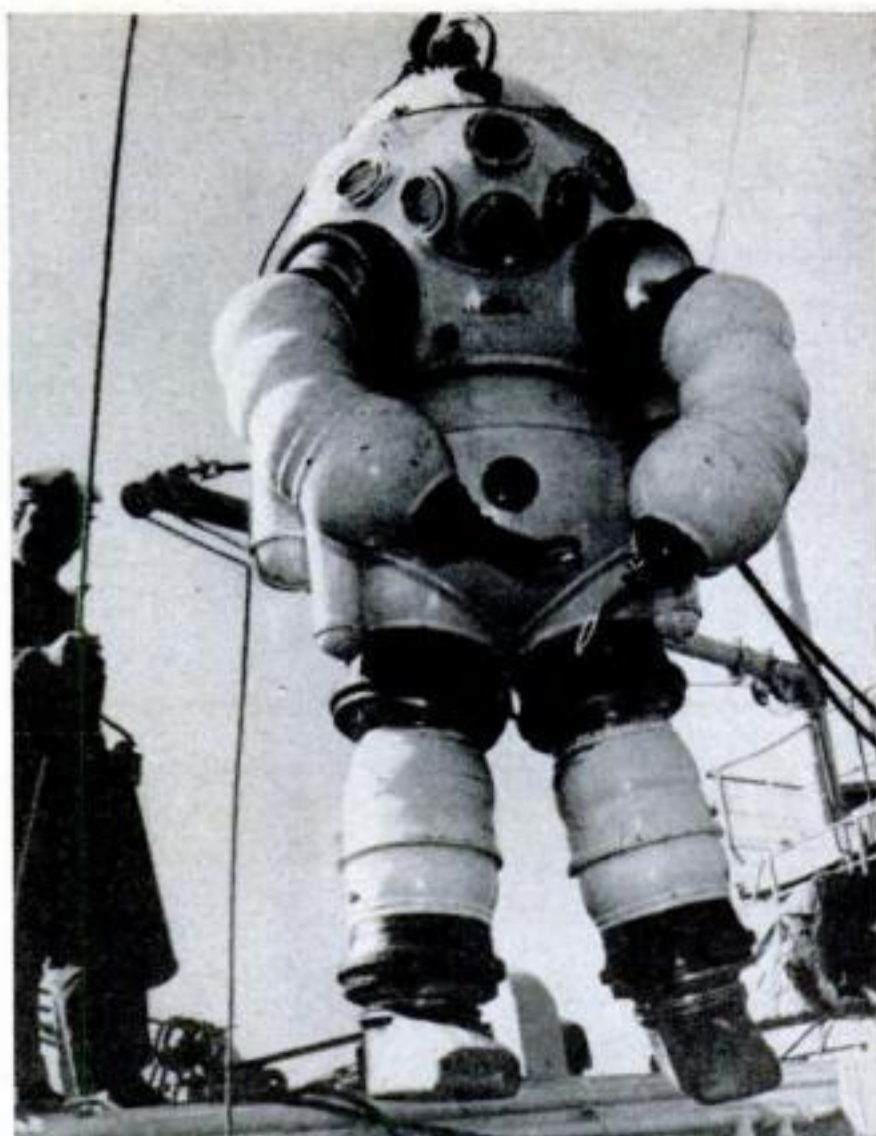
In case after case, while gently relieving pain, actual reduction (shrinkage) took place.

Most amazing of all—results were so thorough that sufferers made astonishing statements like "Piles have ceased to be a problem!"

The secret is a new healing substance (Blo-Dyne\*)—discovery of a world-famous research institute.

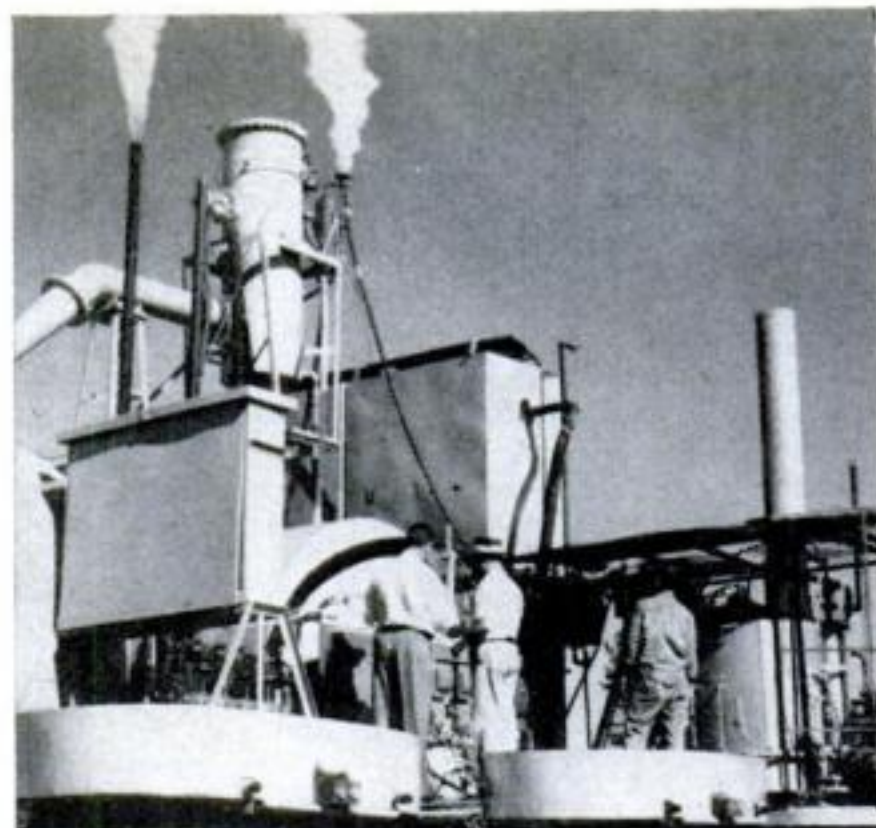
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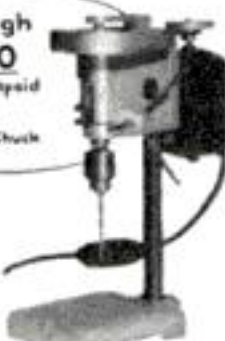
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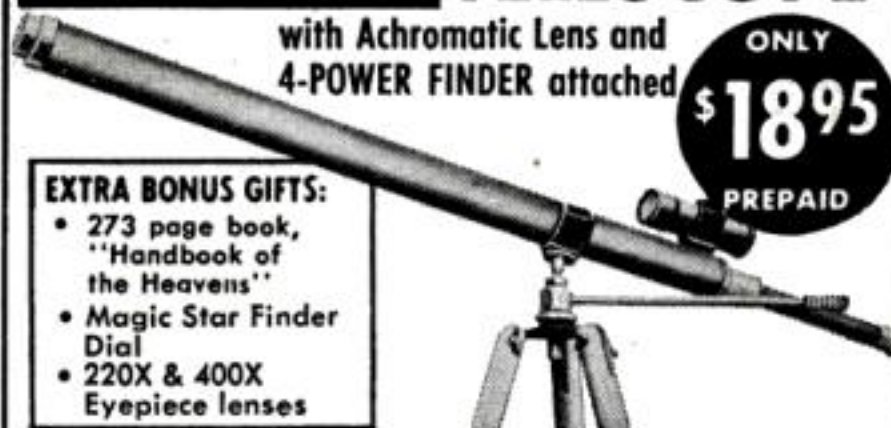
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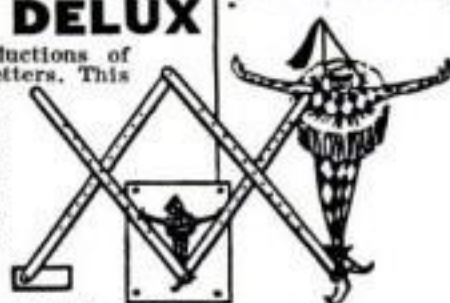
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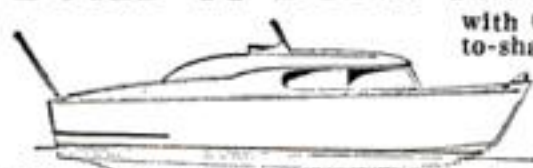
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have invented the game, is called its father by some fans. Alexander J. Cartwright, who devised the rules (nine-man sides, 90-foot base lines, etc.) is called its father by others. But fans who love the figures best nominate Chadwick. He invented the box score, largely unchanged to this day, which made baseball the best recorded of all games.

As baseball grew into a big business, so did baseball statistics. Today, each league has its official statistician. For the National, it's the Al Munro Elias bureau in New York City. For the American, it's the Howe News Bureau, Chicago.

Each league statistician collects figures from the official scorer (a newspaperman) at every game. The scorer, sitting right behind home plate in the press box, keeps figures up-to-the-minute as play proceeds and feeds them to radio and TV announcers.

Should the official scorer need help, as in how to call a play, he can consult the other sports writers around him.

At the end of the game, the scorer mails his totals to the Al Munro Elias or the Howe bureau. Then each league statistician puts all totals together, and mails out daily and weekly releases to ball clubs, magazines, newspapers, radio and TV stations, and to the innumerable baseball yearbooks.

You—and all other fans—are the ultimate consumers of the figures provided by the league statisticians. Their main job is to keep you thinking you can do the manager's job by saturating you with information about baseball—and thereby keeping up your interest.

As the first of the new team statisticians, Roth, on the other hand, has only one customer: Alston. Since most of Roth's figures are secret, he must work alone to get them. "I travel with Brooklyn," he says. "I see every game. Every pitch." What he sees he puts down in symbols and hieroglyphics, half a million a year, in his notebook. It is the most limited-circulation book in baseball: There is only one copy, Roth's own.

The 200-page notebook is divided into seven sections. Each one, of about 30 pages, shows in detail what Brooklyn players have done against another National League team, in every park, day or

night, under all conditions. Quite often, Roth goes over these figures with Alston.

Last year, those pages showed that the Chicago Cubs' Ernie Banks, the league's No. 14 hitter, couldn't hit Don Newcombe for sour apples. So, when possible, without upsetting his pitching rotation, and while keeping Newk also available for Milwaukee (a principal contender),

.....

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.....

Alston pitched Newk against the Cubs. The results: Banks had 22 at bats against Big Newk—without a hit or walk. Chicago lost six games to Newcombe, won only one from him.

In spite of results like this, and in spite of the fact that he may have shown the Dodgers how to collect pennants by walking, Roth refuses to take credit. "Statistics," he says, "are perfectly scientific. But baseball is a human game. In spite of all the figures in the world, it's the men who count. In Brooklyn, it's the manager and the players—and good new men coming up from the farm system—that win ball games."

Other club owners, hiring their own figure men to compete with Roth, have shown they are more certain of his contribution than he is. They point out that the statistics, of both 1956 and the past 10 years, are in Roth's favor.

Like Roth himself, most new figger filberts are not baseball players, but rather men whose closest connection with the game has been to occupy the bleachers or grandstand and to memorize the statistics. In other words, they are fans. So the fans are getting their opportunity at last to tell many a manager just how to run his team. If Roth's story is any indication, it may turn out that the fans, after all these years of waiting for their chance, have a great deal to tell. END



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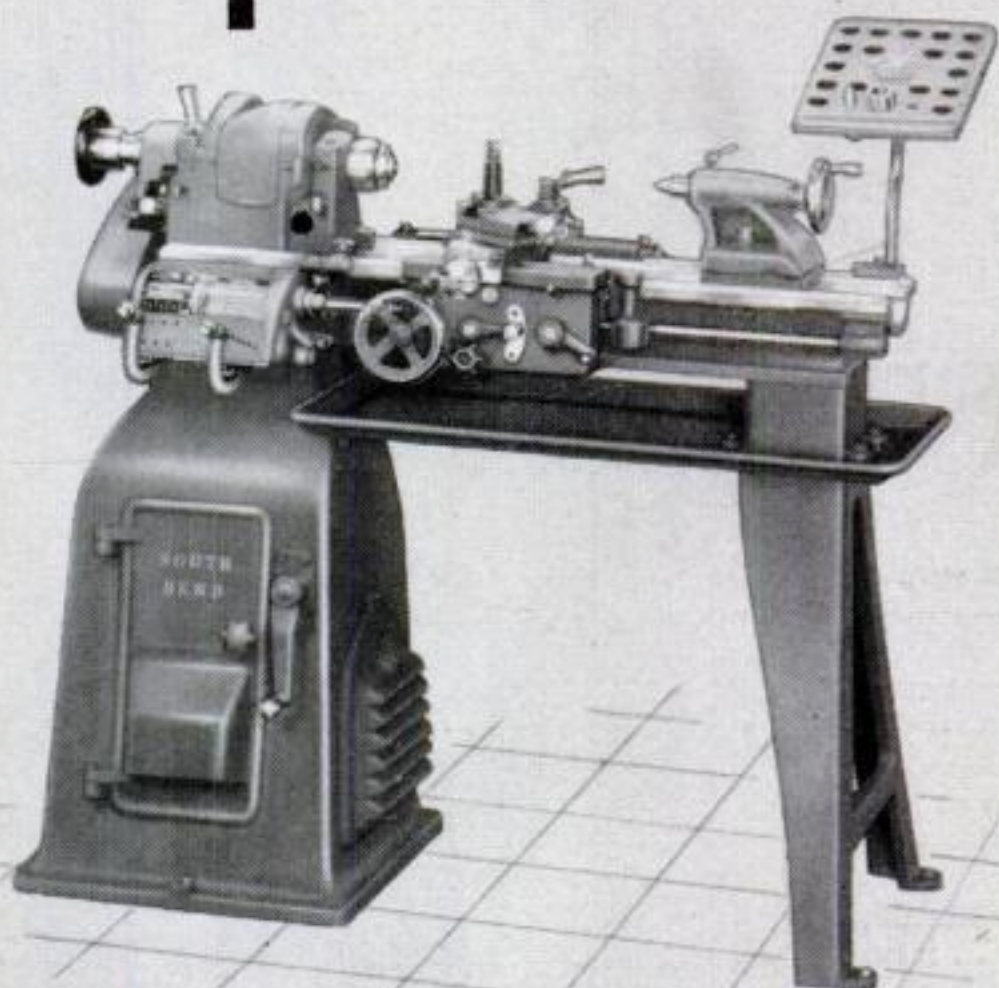
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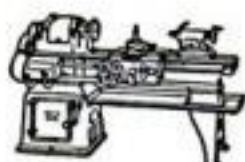
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